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ABSTRACT

SCANS (the Secretary's Commission on Achieving Necessary Skills) provides definitions of the knowledge students and workers need for workplace success and methods for applying these principles in communities throughout the United States. This document contains six articles that give education and training practitioners practical suggestions for applying SCANS in classrooms and workplaces: "SCANS in the Schools" (Kopple et al.) helps educators incorporating SCANS competencies into curricula and instruction by identifying issues likely to arise and giving examples of incorporation of specific competencies; "Implementing SCANS: First Lessons" (Meltzer, White, and Matheson) highlights 10 examples of state and local efforts to strengthen school-work linkages; "Students Use SCANS to Explore Changing Jobs: Lessons of IndianaPLUS" (Harr) describes replicable lessons from a statewide Indiana project in which high school seniors assessed skills requirements in local workplaces and communicated the results to other students and throughout their communities; "Preparing Limited English Proficiency Students for the Workplace" (Grognet) focuses on special issues for educators whose students are first- or second-generation immigrants, and who must teach the SCANS competencies in English and in the context and culture of U.S. workplaces; "Technology and High-Performance Schools: A SCANS Survey" (Schmidt, Packer) specifies what schools and technology companies would buy if they had $1,000 per student to spend on computer hardware; and "Assessment of the SCANS Competencies: Some Examples" (Wirt) features promising activities and approaches for assessing how well the SCANS competencies are being taught and learned. A list of SCANS members is included in the report. (KC)

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TEACHING THE SCANS COMPETENCIES

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U.S. DEPARTMENT OF LABOR

1993

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PREFACE

Three years ago, the Secretary's Commission on Achieving Necessary Skills (SCANS) was formed, and its staff and members--distinguished representatives from education, business, labor, and government--labored mightily to accomplish their mission, as expressed in SCANS' July 1992 final report, Learning a Living: A Blueprint for High Performance: "to encourage a high-performance economy characterized by high-skills, high-wage employment."

This mission of encouragement has been splendidly performed by SCANS, as in its defining the know-how American students and workers need for workplace success (see over) and in the applications of its principles in communities across the United States. Supporting the mission are the SCANS reports (see order form p. 125) Learning a Living; What Work Requires of Schools, the Commission's first report (also in Spanish translation); Skills and Tasks for Jobs, a tracing of the relationship between the SCANS competencies and skills and 50 common occupations; and now, Teaching the SCANS Competencies, uniting six articles that give education and training practitioners practical suggestions for applying SCANS in classroom and workplace.

"SCANS in the Schools" helps educators incorporating SCANS competencies into curricula and instruction; it identifies issues likely to arise and exemplifies incorporation of specific competencies. **"Implementing SCANS: First Lessons"** highlights 10 examples of State and local efforts to strengthen school-work linkages. **Students Use SCANS to Explore Changing Jobs: Lessons of IndianaPLUS** describes replicable lessons from a Statewide Indiana project where high school seniors assessed skills requirements in local workplaces and communicated the results to other students and throughout their communities. **"Preparing Limited English Proficiency Students for the Workplace"** focuses on special issues for educators whose students are first- or second-generation immigrants, and who must teach the SCANS competencies in English and in the context and culture of American workplaces. **"Technology and High-Performance Schools: A SCANS Survey"** specifies what schools and technology companies would buy if they had $1,000 per student to spend on computer hardware. And **"Assessment of the SCANS Competencies: Some Examples"** features promising activities and approaches for assessing how well the SCANS competencies are being taught and learned.

Acknowledgement goes to article authors and to Secretary of Labor Lynn Martin; Assistant Secretary Roberts T. Jones, Employment and Training Administration (ETA); ETA Deputy Assistant Secretary Sally Jo Vasicko; SCANS staffers Arnold Packer (Executive Director), John Wirt (Deputy Director), Ambrose Bittner, Roland Brack, Consuelo Ricart, Michael Schmidt, and Patsy Terhune; Pelavin Associates, Inc. (SCANS research contractor) staffers Michael Kane (Project Director), Norman Peterson, Roselda Henry, Nancy Matheson, Ann Meltzer, Gwen Pegram, and Deborah Whetzel; and ETA editors Abby Martin, Kim Baker, and Scott Herring.

WORKPLACE KNOW-HOW

The know-how identified by SCANS is made up of five competencies and a three-part foundation of skills and personal qualities needed for solid job performance. These include:

COMPETENCIES. Effective workers can productively use:

- ***Resources:*** *allocating time, money, materials, space, staff;*
- ***Interpersonal Skills:*** *working on teams, teaching others, serving customers, leading, negotiating, and working well with people from culturally diverse backgrounds;*
- ***Information:*** *acquiring and evaluating data, organizing and maintaining files, interpreting and communicating, and using computers to process information;*
- ***Systems:*** *understanding social, organizational, and technological systems, monitoring and correcting performance, and designing or improving systems;*
- ***Technology:*** *selecting equipment and tools, applying technology to specific tasks, and maintaining and troubleshooting technologies.*

THE FOUNDATION. Competence requires:

- ***Basic Skills:*** *reading, writing, arithmetic and mathematics, speaking and listening;*
- ***Thinking Skills:*** *thinking creatively, making decisions, solving problems, seeing things in the mind's eye, knowing how to learn, and reasoning;*
- ***Personal Qualities:*** *individual responsibility, self-esteem, sociability, self-management and integrity.*

SCANS IN THE SCHOOLS

By Carol E. Copple, Michael Kane, Nancy S. Matheson, Ann S. Meltzer, Arnold Packer, and Thomas G. White

The authors, except for Arnold Packer, are with Pelavin Associates, Inc. **Dr. Carol E. Copple**, a senior research analyst, has been a classroom teacher, curriculum developer, educational writer and researcher, and teacher trainer. **Dr. Michael Kane**, a Pelavin principal, has managed educational research and evaluation projects in Federal and State education agencies and has been both executive director and chairperson of State education reform commissions. **Nancy S. Matheson**, a research analyst, was senior researcher for the SCANS technical assistance contract, and has researched and written about employee work attitudes, adult learning, and other employment-related issues. **Ann S. Meltzer**, a senior research analyst, was director for the SCANS support contract and previously worked for the American Society for Training and Development, where she co-authored Workplace Basics: The Skills Employers Want. **Arnold Packer**, formerly Executive Director of SCANS, co-authored Workforce 2000: Work and Workers for the 21st Century, a seminal study on human resources policy in government and the private sector. **Dr. Thomas G. White**, a senior research analyst, has been a teacher and curriculum developer, and has written for The Reading Teacher, Reading Research Quarterly, Journal of Experimental Child Psychology, and Journal of Educational Psychology.

This paper addresses the question: How will schools enable students to acquire the SCANS skills? The specific shape and substance of SCANS implementation will vary, of course, from school to school. But it is important to lay out the key dimensions within each SCANS competency, specify what students need to learn, and consider where in the curriculum the skills will be taught. We will also take a look at some of the innovative methods educators are beginning to use to help students acquire necessary skills within each competency.

Exhibit 1 provides the definitions for the five SCANS competencies--resources, information, interpersonal skills, systems, and technology. It also includes examples of tasks or performances that illustrate the use of each skill. Before examining each of the competencies in turn, let us consider a few general points about integrating SCANS into the curriculum.

One of the first questions principals, teachers, curriculum developers, and parents will ask is where within the curriculum SCANS will be taught. Are educators to develop new courses--SCANS 101--or incorporate the learning of SCANS skills into existing courses?

Although a new course or two (e.g. Principles of Technology) might be designed at some schools, the primary place to teach SCANS skills is within existing curricula. SCANS skills can and should be integrated into each subject in the core curriculum. Exhibit 2 illustrates how each subject-matter area can be used to develop each competency.

EXHIBIT 1
Definitions: The Competencies

RESOURCES

Allocates Time. Selects relevant, goal-related activities, ranks them in order of importance, allocates time to activities, and understands, prepares, and follows schedules.

Examples:
- construct a timeline chart, e.g., Gantt, PERT;
- understand the concept of a critical path;
- estimate the time required to complete a project by task; or
- use computer software, e.g., Harvard Project Planner, to plan a project.

Allocates Money. Uses or prepares budgets, including cost and revenue forecasts; keeps detailed records to track budget performance; and makes appropriate adjustments.

Examples:
- estimate costs;
- prepare a multi-year budget using a spreadsheet; or
- do a cost analysis.

Allocates Material and Facility Resources. Acquires, stores, and distributes materials, supplies, parts, equipment, space, or final products in order to make the best use of them.

Examples:
- lay out a workspace document with narrative and graphics using desktop publishing software;
- demonstrate understanding of First In First Out (FIFO) and Just in Time (JIT) inventory systems; or
- design a request for proposal (RFP) process.

Allocates Human Resources. Assesses knowledge and skills and distributes work accordingly, evaluates performance, and provides feedback.

Examples:
- develop a staffing plan;
- write a job description; or
- conduct a performance evaluation.

EXHIBIT 1 (Continued)
Definitions: The Competencies

INFORMATION

Acquires and Evaluates Information. Identifies need for data, obtains it from existing sources or creates it, and evaluates its relevance and accuracy.

Examples:
- develop a form to collect data;
- research and collect data from appropriate sources (library, on-line data bases, field research); or
- develop validation instrument for determining accuracy of data collected.

Organizes and Maintains Information. Organizes, processes, and maintains written or computerized records and other forms of information in a systematic fashion.

Examples:
- develop a filing system for storing information (printed or computerized);
- develop an inventory record-keeping system; or
- develop a bill processing system.

Interprets and Communicates Information. Selects and analyzes information and communicates the results to others using oral, written, graphic, pictorial, or multi-media methods.

Examples:
- produce a report using graphics to interpret and illustrate associated narrative information;
- make an oral presentation using several different media to present information (overheads, slides, film, audio); or
- develop material for communicating information to be used during a teleconference call.

EXHIBIT 1 (Continued)
Definitions: The Competencies

Uses Computers to Process Information. Employs computers to acquire, organize, analyze, and communicate information.

Examples:
- use a computer spreadsheet, e.g., Lotus 1-2-3, to develop a budget;
- use a computer graphics program, e.g., Harvard Graphics, to prepare overheads for a report; or
- use on-line computer data bases, e.g., Lexus, New York Times, ERIC, to research a report.

INTERPERSONAL

Participates as a Member of a Team. Works cooperatively with others and contributes to group with ideas, suggestions, and effort.

Examples:
- collaborate with group members to solve a problem;
- develop strategies for accomplishing team objectives; or
- work through a group conflict situation.

Teaches Others. Helps others learn.

Examples:
- train a colleague on-the-job; or
- explore possible solutions to a problem in a formal group situation.

Serves Clients/Customers. Works and communicates with clients and customers to satisfy their expectations.

Examples:
- demonstrate an understanding of who the customer is in a work situation;
- deal with a dissatisfied customer in person; or
- respond to a telephone complaint about a product.

EXHIBIT 1 (Continued)
Definitions: The Competencies

Exercises Leadership. Communicates thoughts, feelings, and ideas to justify a position; and encourages, persuades, convinces, or otherwise motivates an individual or group, including responsibly challenging existing procedures, policies, or authority.

Examples:
- use specific team-building concepts to develop a work group;
- select and use an appropriate leadership style for different situations; or
- use effective delegation techniques.

Negotiates. Works towards an agreement that may involve exchanging specific resources or resolving divergent interests.

Examples:
- develop an action plan for negotiating;
- write strategies for negotiating; or
- conduct an individual and a team negotiation.

Works with Cultural Diversity. Works well with men and women and with a variety of ethnic, social, or educational backgrounds.

Examples:
- demonstrate an understanding of how people with differing cultural/ethnic backgrounds behave in various situations (work, public places, social gatherings); or
- demonstrate the use of positive techniques for resolving cultural/ethnic problem situations.

SYSTEMS

Understands Systems. Knows how social, organizational, and technological systems work and operates effectively within them.

Examples:
- draw and interpret an organizational chart;
- develop a chart that illustrates an understanding of stocks and flows; or
- draw a diagram that illustrates a technological problem definition and problem-solving process.

EXHIBIT 1 (Continued)
Definitions: The Competencies

Monitors and Corrects Performance. Distinguishes trends, predicts impact of actions on system operations, diagnoses deviations in the function of a system/organization, and takes necessary action to correct performance.

Examples:
- generate a statistical process control (SPC) chart;
- develop a forecasting model; or
- develop a monitoring process.

Improves and Designs Systems. Makes suggestions to modify existing systems to improve products or services, and develops new or alternative systems.

Examples:
- draw a diagram showing an improved organizational system based on Deming's 14 points; or
- choose a situation needing improvement, break it down, examine it, propose an improvement, and implement it.

TECHNOLOGY

Selects Technology. Judges which set of procedures, tools, or machines, including computers and their programs, will produce the desired results.

Example:
- read equipment descriptions and technical specifications to select equipment to meet needs.

Applies Technology to Task. Understands the overall intent and the proper procedures for setting up and operating machines, including computers and their programming systems.

Example:
- set up/assemble appropriate equipment from instructions.

Maintains and Troubleshoots Technology. Prevents, identifies, or solves problems in machines, computers, and other technologies.

Examples:
- read and follow instructions for troubleshooting and repairing relevant equipment; or
- read and follow maintenance instructions for keeping relevant equipment in good working order.

EXHIBIT 2
Assignments that Integrate the SCANS Competencies Into the Core Curriculum Area

	CURRICULUM AREA				
Competency	**English/Writing**	**Mathematics**	**Science**	**Social Studies/Geography**	**History**
Resources	Write a proposal for an after-school career lecture series that schedules speakers, coordinates audio-visual aids, and estimates costs.	Develop a monthly family budget, taking into account expenses and revenues, and--using information from the budget plan--schedule a vacation trip that stays within the resources available.	Plan the material and time requirements for a chemistry experiment, to be performed over a two-day period, that demonstrates a natural growth process in terms of resource needs.	Design a chart of resource needs for a community of African Zulus. Analyze the reasons why three major cities grew to their current size.	Study the Vietnam War, researching and making an oral presentation on the timing and logistics of transport of materials and troops to Vietnam and on the impact of the war on the Federal budget.
Interpersonal Skills	Discuss the pros and cons of the argument that Shakespeare's *Merchant of Venice* is a racist play and should be banned from the school curriculum.	Present the results of a survey to the class, and justify the use of specific statistics to analyze and represent the data.	Work in a group to design an experiment to analyze the lead content in the school's water. Teach the results to an elementary school class.	In front of a peer panel, debate whether to withdraw U.S. military support from Japan. Simulate urban planning exercise for Paris.	Study America's Constitution and roleplay negotiation of the wording of the free States/slave States clause by different signers.
Information	Identify and abstract passages from a novel to support an assertion about the values of a key character.	Design and carry out a survey, analyzing data in a spreadsheet program using algebraic formulas. Develop table and graphic display to communicate results.	In an entrepreneurship project, present statistical data on a high-tech company's production/sales. Use computer to develop statistical charts.	Using numerical data and charts, develop and present conclusions about the effects of economic conditions on the quality of life in several countries.	Research and present papers on effect of Industrial Revolution on class structure in Britain, citing data sources used in drawing conclusions.

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	CURRICULUM AREA				
Competency	**English/Writing**	**Mathematics**	**Science**	**Social Studies/Geography**	**History**
Systems	Develop a computer model that analyzes the motivation of Shakespeare's *Hamlet.* Plot the events that increase or decrease Hamlet's motivation to avenge the death of his father by killing Claudius.	Develop a system to monitor and correct the heating/cooling process in a computer laboratory, using principles of statistical process control.	Build a model of human population growth that includes the impact of the amount of food available on birth and death rates, etc. Do the same for a growth model for insects.	Analyze the accumulation of capital in industrialized nations in systems terms (as a reinforcing process with stocks and flows).	Develop a model of the social forces that led to the American Revolution. Then explore the fit between that model and other revolutions.
Technology	Write an article showing the relationship between technology and the environment. Use word processing to write and edit papers after receiving teacher feedback.	Read manuals for several data-processing programs and write a memo recommending the best programs to handle a series of mathematical situations.	Calibrate a scale to weigh accurate portions of chemicals for an experiment. Trace the development of this technology from earliest uses to today.	Research and report on the development and functions of the seismograph and its role in earthquake prediction and detection.	Analyze the effects of wars on technological development. Use computer graphics to plot the relationship of the country's economic growth to periods of peace and war.

The skills identified by SCANS as necessary for work are already taught to a limited extent in existing courses. For instance, students may learn about ecological systems in a science class. But even when such knowledge is embedded in the current curriculum, it typically is not made intellectually explicit. In addition, teachers and students are not connecting a particular isolated piece of knowledge (the forest as an ecological system) to the broader competency (learning how systems function). When such connections are not made explicit, students are less likely to generalize skills and knowledge and to apply them in new situations.

It is especially important to connect knowledge and skills to the workplace so that students can see how they will use them. Creating such connections leads to the question of how SCANS skills are best taught and learned. Do we need different instructional methods as well as different curricula?

Chapter 4 of the SCANS report Learning a Living: A Blueprint for High Performance outlines the instructional implications of SCANS. A major emphasis is teaching skills in context. This means placing learning objectives within real environments rather than insisting that students first learn in the abstract what they will later be expected to apply. Teaching in context implies that schools will provide students with the opportunities to apply knowledge in real-life situations or simulations, e.g., problems or projects related to workplace situations, as well as internships, mentorships, and "shadowing" workers on the job.

Along with the SCANS emphasis on learning in context is the focus on students becoming more active in their own learning. In the view of the Commission, students do not learn to grapple with problems and to apply skills if teachers are always directing the learning and doing the talking. Working together on problems, students are more responsible for their own learning, more actively involved. Most importantly, they are functioning as they will in the workplace.

Integrating All the SCANS Competencies

In the workplace, we do not use one skill at a time in isolation from other skills; effective performance requires many different skills used in combination. It stands to reason, then, that students benefit from working on tasks and problems that call on a range of skills. Here's an example, from a chemistry class in the Fort Worth Independent School District:

> A high school chemistry teacher gave his students a problem: to determine the best lawn fertilizer for the school to use. Students worked together in small groups, and each group tackled the problem in its own way. They designed experiments to investigate the effects of fertilizers differing in chemical composition. When they needed more information,

they called on experts from industry or academia. Their recommendations were not based only on applying chemistry and using scientific methods; they also had to weigh costs and other feasibility factors. Once they reached conclusions, students had to develop reports, including charts and computer graphics, which would present their conclusions and persuade school decision-makers to accept their recommendations. They studied how such decisions are made within the institution, determined how to inform and convince key players, and participated in the negotiation process.

Clearly, such a project develops skills within the five SCANS competencies of resources, information, interpersonal skills, systems, and technology. Teachers with different skills and/or subject-matter expertise (writing, computer graphics, etc.) will probably participate at various junctures, as will experts in the community. Working on such a project, students acquire and practice skills in ways they will actually use them on the job; they use many skills in combination, and all skills are directed towards a purpose.

This project, it should be noted, is not based on a problem neatly defined in advance with an answer that the teacher knows and the students must arrive at. New complexities and side issues arise as the students wade into a problem like the problems adults encounter in real jobs.

Moreover, there are real-world outcomes of students' work. The soundness of the students' research, the degree to which they consider the full range of relevant factors, the cogency with which they present their recommendations, and the savvy with which they deal with the powers-that-be will determine whether their recommendations are accepted. The motivation to perform each task well does not rest solely on a grade but is intrinsic to the enterprise--the better a task is carried out, the more likely a successful final outcome. These elements are all important for effective education.

SCANS in the K-12 Curriculum

The details of what to teach at the elementary, middle school, and secondary levels (as well as in postsecondary settings) will need to be worked out for each competency and will take much careful thought and experimentation by teachers and curriculum developers. In this section, we offer a few generalizations about the developmental progression in teaching SCANS-related skills and knowledge, and we provide an example of how one set of skills, "acquiring and using information," might be taught at elementary, middle, and secondary school levels.

In considering the timing for introducing SCANS skills, students should not specialize too early--that is, pursue a specific occupation or field to the

exclusion of others--but should **begin by developing the fundamental conceptual foundation and skills that will allow them to acquire more specialized skills later on.** From the beginning, instruction in this conceptual foundation should be integrated with the core subject areas.

In a model dropout-prevention program designed by the National Academy Foundation, for instance, 11th graders may opt to enter one of the specialized programs designed to prepare them for a specific field (e.g. finance, travel and tourism, public affairs), but up through 10th grade they acquire skills applicable in all occupations and jobs. In the interpersonal skills area, for instance, they learn to participate in a group, assess group effectiveness, give and receive constructive criticism, and teach others new skills. These generic skills--useful and important in every field and job--belong in every student's course of study and should precede instruction in more specialized skills.

This observation leads to the next key point about sequences of instruction. Students usually do not acquire a particular skill at only a single point in time--for example, they do not learn the skill of participating in a group in fourth grade and then move on to other skills. Rather, they keep developing group participation skills--or any set of skills--at **successively more advanced levels.**

The model is that of a spiral, in each competency developed throughout the K-12 curriculum. Exhibit 3 illustrates how this works. Students in the elementary grades have a range of experiences with developing data forms, such as the one described, that gives them a sense of being able to develop forms to serve their purposes and shows them how to go about doing this. By middle school, their experience base, as well as their higher stage of cognitive development, allows them to tackle more complex and advanced tasks in gathering and presenting data. Still more sophisticated tasks and procedures, such as sampling, are introduced at the high school level.

Spirals of this kind--with a greater number and complexity of skills drawn into learning activities at higher grade levels--can be designed for any set of skills within the SCANS competencies. The factors noted under "Developmental Considerations" in Exhibit 3 are not exhaustive lists of all aspects of development that educators will need to consider; they only illustrate the kinds of developmental issues that arise in planning a coherent curriculum across the K-12 span.

EXHIBIT 3
Teaching a Given Competency at Different Developmental Levels

Competency: Acquiring and Using Information, particularly **developing a form to collect data, presenting results with charts and tables,** and **using a computer** to create the form and to present data.

[Grades K-3] In planning for Family Night at the school, a team of second graders determines that it needs to know how many adults and children of various ages are planning to attend. The teacher suggests that team members develop a simple form to circulate in order for classmates to indicate who in their families will be coming. They also write simple instructions. From classmates' questions, the team sees a point that needs to be clarified in the instructions and makes the necessary revision.

What's Developed in This Activity

- Awareness of the usefulness of a form in gathering information.
- Direct experience of the fact that a form will not serve its purpose if it is not clear to respondents what information they are being asked to supply.
- Recognition of the value of pilot-testing a form with a group before making it final.

Developmental Considerations

In designing the activity for this age group, the teacher needs to take into account such developmental considerations as that:

- The purpose of the task must be clear and meaningful to students. While important at all levels, this is especially critical with younger students because they have limited experience with forms. They need to get a clear sense that forms are devised to help gather information in an efficient way.
- The task must not be too complex. There should be only a few factors to take into account, and the nature of the information being gathered should be straightforward and familiar to the children (e.g., the number of parents who are planning to come). In addition, the technology used to produce the form (in this case writing it by hand) should not be so demanding that students are unable to focus on planning the form itself.
- Feedback to students (from trying out the form) should occur as soon as possible after they finish their product. Young children's interest and motivation will diminish if there is too much delay between task completion and feedback.

EXHIBIT 3 (Continued)
Teaching a Given Competency at Different Developmental Levels

[Grades 7-8] In discussing public opinion polls with a social studies class, the teacher asks the students to develop their own survey of class opinion. They choose an issue of interest to them: the rating system for movies (R, PG-13, etc.). Each class member writes three potential questions for the survey, and one group of students works out an efficient system for compiling these as a starting point for developing the survey form. Another student group has the job of selecting and editing the questions and laying out the survey form, using word processing software that group members have used before in writing activities but not in producing forms. When these students are debating whether to ask "Do you think the rating system is censorship?" or "Do you think the rating system is wrong?", the teacher suggests they produce two versions of the form and try each on half the students (and, indeed, they get different results). A third group tallies the number of "Yes," "No," and "Undecided" responses to each question and (with calculators) converts these results into percentages. A fourth group looks at how magazines and newspapers display public opinion results, decides to use pie and bar charts, produces them, and gets class reactions to the two ways of displaying the data.

What's Developed in This Activity

Among the many skills developed in this activity, two are closely related to competence in gathering and presenting information:

- Awareness of how differences in forms (e.g., changes in wording) can change results.
- Familiarity with the various ways of presenting survey information and the advantages and disadvantages of each.

Developmental Considerations

- Middle school students can understand the difference between opinion and fact and recognize what is involved in gathering either.
- Understanding that changing the wording of a question can change reported opinion is well within the grasp of these students, and is an important concept for them to bear in mind in acquiring information from others.
- Analyses and presentation of data, while more advanced than in early childhood, are still relatively simple and straightforward.

EXHIBIT 3 (Continued)
Teaching a Given Competency at Different Developmental Levels

[High School] The student council at Lincoln High School decides to conduct a survey to find out what students want the council to do that year. The form it develops requests certain basic information (e.g., name, age, sex, grade) and asks several questions to elicit students' views. In addition, council members want to talk in depth with a few dozen students. The faculty advisor suggests that, instead of just talking to the people they know best, they do a random sample to determine which students to interview. One senior math class is studying basic sampling, and the council members present the sampling problem to the math class and get its help. Council members, asked about the purpose of the in-depth interviews, respond that they want to know the views of the student body as a whole--males and females at all grades. To achieve a representative group of interviewees, it is decided to divide the forms into piles by sex within each grade and to draw from each pile the forms of four students and one alternate. When the survey is completed, the council members compile the responses, work with computer graphics to find a clear and compelling way of conveying the results, and then use the graphics in making an oral presentation to the student body about the directions the student council will be taking in the coming year.

What's Developed in This Activity

- Further practice with developing forms that are efficient and readily understandable.
- Increased awareness of the purpose of sampling in real-life situations--achieving representativeness without having to survey every individual--and practice applying simple sampling concepts and procedures to a specific need.
- Facility in using computer graphics for presenting data and evaluating which methods best serve the purpose.

Developmental Considerations

- Students' foundation in math and earlier experiences with creating forms and surveys prepare them to take the additional step of working with sampling.
- Having had a range of previous experiences with creating and interpreting charts of different kinds and considering which suit various purposes, students can now begin doing the same thing with computer graphics. If they had had little experience with charts, it would be premature to have them producing charts using computer-graphics technology.
- By this point in their development, students are able to take greater responsibility in their learning and extracurricular activities, often determining their own agenda and problems, identifying needed resources, and making their own choices and decisions.

For each of the five competency areas (resources, information, interpersonal skills, systems, and technology), the following sections will describe key dimensions and concepts; knowledge/skills requirements at the career-ready level for specific jobs (based upon interviews with holders and supervisors of a wide variety of jobs, as detailed in the SCANS report Skills and Tasks for Jobs); examples of educational innovation (with citations or contacts); and suggestions for further reading. SCANS publications are listed on the order form at p. 125.

RESOURCES

We allocate resources in many of our daily activities, such as when we develop a monthly household budget or schedule the diverse activities of family members. Allocating resources--time, money, people, and materials --is also important on the job.

Key Dimensions and Concepts. The skills needed to allocate resources have been defined in Exhibit 1. The first skill involves allocating time. The dimensions involved in performing this skill competently include:

- identifying tasks to be completed;
- ranking tasks in order of importance;
- estimating key task variables, such as importance, time to complete tasks, time available for task completion, and task deadlines;
- developing and following an effective, workable schedule based upon these estimates;
- avoiding wasting time; and
- evaluating and adjusting a schedule.

The second skill involves allocating money. In order to perform this skill effectively, an individual needs to be proficient at:

- preparing and using a budget according to a consistent and orderly accounting method;
- projecting costs and revenues;
- calculating future budgetary needs based upon these projections;
- tracking the extent to which actual costs and revenues differ from the estimated budget; and
- taking appropriate and effective actions to adjust the budget.

The third skill is allocating material and facility resources. The key dimensions underlying performance of this skill include:

- planning the steps involved in the acquisition, storage, and distribution of resources, including space;

- safely and efficiently acquiring, transporting, or storing resources;
- maintaining them in good condition; and
- distributing them to the end user.

Completing the set of resource skills is allocating human resources. Effective human resources allocation requires:

- assessing peoples' knowledge, skills, abilities, and potential;
- identifying present and future workload characteristics and needs;
- making effective matches between individual talents and workload requirements;
- actively monitoring performance; and
- providing feedback.

By acquiring competence at allocating resources, students are learning to perform some of the basic functions of management--planning, organizing, and controlling. Each resources skill, to varying degrees, involves these functions.

The importance of these three functions, beginning with **planning**, is illustrated in an example from the workplace. A pool of secretaries at a mid-sized accounting firm must deal with the increased workload and changing priorities of work during tax season, from January through at least April of each year. The lead secretary, Pat Munroe, sets aside some time one morning to assess the work that must be completed over the next several months, including ongoing projects and yearly tax returns. An influx of work is forecast during February and March, as accountants conduct the tax work necessary for the secretaries' preparation of tax forms. The goal of the secretaries' efforts is to complete tax or extension forms by April 15 without falling behind on other secretarial duties. Pat also projects what materials and forms will be needed to meet the increasing work demands and what personnel will be necessary to complete the work.

Pat's planning supports the next management function, **organizing**. Action plans are developed to accomplish the work and achieve the specified goals. Pat and the other staff secretaries now have to develop work schedules that reflect both short- and long-term deadlines. They set priorities for tasks according to importance, and estimate time needed and available to complete each tax return. Pat anticipates that several accountants will fall behind schedule and develops a contingency work plan.

Finally, Pat compares the group's progress with the anticipated goals at weekly intervals by asking questions: Would the group meet its time deadlines? Was it completing all of its work, including client activities unrelated to taxes? Was the remaining supply of forms and materials adequate for projected needs? Were enough personnel available to complete the work in a timely manner? This facet of management, **controlling**, is concerned with monitoring, assessing, evaluating, and

adjusting behaviors and activities to better meet identified needs or goals. While monitoring work activities, Pat determines that, at the present pace, meeting the April 15 deadline is not likely. Additional staff are allocated to the task, based upon their experience with tax-form preparation and their ability to work under pressure.

Requirements for Career-readiness.

A **quality-control inspector** allocates time and space when establishing a system for inspecting elevators in a given area within a given time frame. This includes organizing required inspections based on their due dates and establishing a geographical route that facilitates the best use of time for inspections. In order to perform these tasks effectively, the inspector is likely to:

- chart inspection due dates and geographical location of inspection sites (e.g., prepare a timeline or other chart);
- estimate the time needed and available to conduct an inspection and possible contingencies (e.g. travel time, conflicts, and time needed to schedule inspections); and
- generate a schedule of inspections that makes the best use of time and space by grouping key inspections in the same general geographical area.

A **chef** is required to allocate money when performing a cost analysis on menu items in order to turn a profit. This involves calling purveyors and searching for the freshest products, as well as assessing the costs for various elements of preparation. To allocate money as required in this task, the chef must:

- identify, search for, and collect information concerning the freshness and costs of available meats and produce;
- assess or project customer demand for the product; and
- estimate costs (such as for labor, ingredients, and garnishes), cooking-weight loss, and revenues (such as by using a computer-spreadsheet program).

A **travel agent** is required to allocate material and facility resources when acquiring and storing travel materials (e.g. brochures, catalogs, and forms) for subsequent distribution to customers. This includes finding a storage space for travel materials, ordering and storing materials in a consistent manner, retrieving materials as needed, and distributing them to clients. Performing these tasks effectively requires the travel agent to:

- identify client needs and collect relevant materials;
- plan the most effective layout for storing the materials to ensure easy access (i.e., group them by travel-service providers, such as tourist information centers, airlines, hotels, and rental car agencies);

- store materials according to the chosen layout; and
- take an inventory of the materials and acquire additional materials when necessary.

An **assistant housekeeper** is required to allocate human resources when scheduling employees in productive working groups. This involves determining who is available to work at a given time, pairing the inexperienced workers with more experienced colleagues, placing the appropriate employees in work time-slots, and logging the names of unavailable employees for future reference. To perform these tasks effectively, the assistant housekeeper must be able to:

- forecast staffing needs;
- conduct a performance appraisal; and
- draw up a staffing plan, pairing experienced with inexperienced staff.

Examples of Educational Innovation

Resources skills traditionally have been introduced in courses, such as life skills and personal management, available primarily to vocational education students. Several recent educational initiatives afford all students the opportunity to develop and practice these important skills in realistic contexts. This section presents a sampling of courses and activities occurring both within and outside of vocational education.

The **New York State Education Department** has produced a **curriculum module on personal resource management** to develop a student's knowledge and skill in the management of time and human and economic resources. In a time-management activity, for example, students analyze case studies involving effective time management and the development, use, and evaluation of a weekly time/activity schedule. To develop skill at managing human resources, they analyze case studies illustrating successful management of human resources, and they participate in small group-brainstorming sessions on how members of a given group contribute individually to the success or failure of the group. The management of economic resources includes student performance objectives dealing with achievement of financial goals and with understanding and preparing a personal budget. (**SEE:** Working Citizen Personal Resource Management: Introduction to Occupations. Albany, N.Y.: State Education Department, Division of Occupational Education Programs, 1986.)

Personal and family financial planning is a natural way to introduce students to the SCANS skill of allocating money. The **Association of Teacher Educators and the American Council of Life Insurance** have published a **guide to financial planning education** for educators. Included in the guide are sample learning activities related to allocating money, such as learning the steps in planning a budget, discussing the similarities and differences between a family and a government budget, and collecting

forms and guides useful in setting up a budget. (**SEE:** Financial Planning Education: A Challenge for Teachers, Trainers, and Institutions. Washington, D.C.: The Association of Teacher Educators, 1982.)

The **Interactive Mathematics Project** (IMP), a joint venture of the **University of California at Berkeley and San Francisco State University**, is a three-year pilot project in which students learn mathematics by solving a variety of real-world problems. The structure of the Interactive Mathematics Project enables students to gain expertise in SCANS resource skills. In a unit entitled "The Overland Trail," students study the issues faced by those who migrated westward during the mid-1800s. They apply mathematical concepts when deciding what to take during the move, estimating the cost of the move, studying rates of consumption and travel, and estimating the time required to reach the destination. The IMP curriculum is currently being tested in selected classrooms and is not readily available for general use. (**CONTACT:** Mary Jo Cittadino, Network Coordinator, EQUALS, Lawrence Hall of Science, University of California, Berkeley, CA 94720, (510) 642-1823.)

The **National Academy Foundation** is a collaborative effort between schools and businesses to motivate and prepare youth for careers in finance, travel and tourism, manufacturing, and public service, and to develop appropriate curricular material. In a **time-management exercise** in this material, students analyze how they spend their time and suggest strategies to maximize the use of time. Among the activities used to develop the concept of time management are: (1) "Who am I?" collages created by students to stimulate discussions of how they spend their time; (2) use of a calendar to plot individual schedules; and (3) introduction of a brainstorming activity to generate ways to use time more effectively. Homework includes identifying the major tasks faced by the student in the next two months and generating a list of major personal time-wasters. (**CONTACT:** Bernadette Toomey, National Academy Foundation, 1155 Connecticut Ave., N.W., 10th Fl., Washington, DC 20036, (202) 296-7132.)

Charles Jett, a partner with a Chicago-based executive search firm, has designed the **Critical Skills Project** (see pp. 58-59) to provide high school students with classroom and practical exposure to critical skills, including time management. These skills are then practiced by student groups who provide consulting services to local organizations and businesses. Time-management skills are introduced to students in a project-management module which includes techniques useful to time management, such as Gantt and PERT charts; scheduling multiple projects with time conflicts; and managing deadlines. Students construct a simple work plan during a classroom activity that explores managing time. Students also are expected to construct a Gantt Chart for scheduling normal high school activities and to be able to revise the chart in response to changing events and priorities. By providing consulting services to the business community, students are

able to practice their newly-acquired skills, for instance by developing a project work-plan illustrated by a Gantt chart.

An example of developing resources-allocation skills at the elementary level is the **Community Within Academic Walls, Caloosa Elementary School, Cape Coral, Florida**. Classroom establishments--stores, a postal system, a restaurant, a TV station, an employment agency, a publishing company, a government agency, and a bank--offer students opportunities to practice a variety of resources skills. Skills in allocating money, for instance, are developed in the Caloosa Bank. Regularly depositing and maintaining "Caloosa money" in savings or checking accounts enables students to develop a sense of financial responsibility and to decide how much money to allocate, for instance, for buying goods at the Caloosa store. (**CONTACT:** Carolyn Zenoniani, Principal, Caloosa Elementary School, 620 South Del Prado Blvd., Cape Coral, FL 33904, (813) 574-3113.)

In the **entrepreneurship class at Mount Edgecumbe High School in Sitka, Alaska**, students operate a company that produces and exports smoked salmon to Japan. The students make a variety of resources-related decisions regarding their operations. In addition, students in the high school's business course gain expertise at allocating money by using spreadsheets to map the costs associated with their planned lifestyles after graduation. (**CONTACT:** Larrae Rochelau, Mount Edgecumbe High School, 1330 Seward Ave., Sitka, AK 99835, (907) 966-2201.)

The **International Time Management Institute** (ITMI), an organization committed to increasing personal and professional productivity, offers a variety of workshops and products to achieve this aim. (**CONTACT:** ITMI, 3800 Monroe Avenue, Pittsford, NY 14534, (716) 383-6000.)

Suggestions for Further Reading

Allocating Time

Blanchard, K. and S. Johnson, The One Minute Manager. New York: The Berkley Publishing Group, 1983.

Lakein, A., How to Get Control of Your Time and Your Life. New York: P. H. Wyden, 1973.

Mackenzie, A., The Time Trap. New York: AMACOM, 1990.

Allocating Money

Mittra, S., Practical Financial Planning: A Complete Guide for Professionals. Englewood Cliffs, N.J.: Prentice-Hall, 1990.

Sweeny, A. and R. Rachlin, eds., Handbook of Budgeting. New York: Wiley, 1987.

_____ and J. Wisner, Budgeting Fundamentals for Nonfinancial Executives. New York: AMACOM, 1975.

Allocating Materials and Facilities

Bowersox, D., Logistical Management. New York: MacMillan, 1978.

Busch, H., "Integrated Materials Management," International Journal of Physical Distribution and Materials Management, Vol. 18 (1988), pp. 28-39.

International Journal of Physical Distribution and Materials Management, a monthly periodical exploring key materials-management issues.
Young, S., "Hospital Materials Management: Systems and Performance," Journal of Purchasing and Materials Management, Vol. 25 (1989), pp. 31-35.

Allocating Human Resources
Alpander, G., Human Resources Management Planning. New York: AMACOM, 1982.
Cascio, W., Applied Psychology in Personnel Management. Englewood Cliffs, N.J.: Prentice-Hall, 1987.
Human Resource Planning, a monthly periodical exploring key issues in human resources planning.
Manzini, A., "Human Resources Planning and Forecasting," in Human Resources Management and Development Handbook, W. Tracey, ed., pp. 507-529. New York: AMACOM, 1985.
Page, R. and D. Van De Voort, "Job Analysis and HR Planning," in Human Resource Planning, Employment & Placement, W. R. Cascio, ed., pp. 2.34-2.72. Washington: Bureau of National Affairs, 1989.

INFORMATION

In today's information society, people of all ages find, use, evaluate, and communicate many kinds of information every day. We use information to solve problems, make decisions, and carry out even the simplest daily activities, such as using a TV schedule, looking for the weather forecast, or using the telephone book.

In the past, schools have seen as a major part of their job the conveying of information to students. Though it is still important for students to acquire certain information, it is becoming more and more important for them to acquire the skills of finding, evaluating, compiling, packaging, and communicating information.

Key Dimensions and Concepts

Exhibit 1 listed and defined the four information skills identified by SCANS. A central information skill is acquiring and evaluating information. In order to acquire and evaluate information proficiently, the individual must be skilled at:

- analyzing questions to determine information needed;
- selecting and evaluating information; and
- determining when new information must be created.

A separate but related skill is organizing and maintaining information, for instance, setting up and maintaining files or a database. Effectively performing this skill requires:

- understanding and organizing information from computer, visual, oral, and physical sources in readily accessible formats (e.g. computerized data bases, spreadsheets, microfiche, video disks, and

- paper files), and transforming data in order to organize it (e.g. by sorting, classifying, or more formal methods).

Another highly critical skill in the workplace is interpreting and communicating information to others. Competent performance of this skill requires expertise at:

- determining information to be communicated;
- identifying the best methods to present information (e.g. overheads, handouts);
- choosing the best format for display (e.g. line graphs, bar graphs, tables, pie charts, narrative);
- converting information to the desired format; and
- conveying information to others through a variety of means (e.g. oral presentation, written communication).

Finally, SCANS includes as a distinct skill using computers to process information, which requires the three previous skills and demands computer-specific skills as well. These include:

- entering, modifying, retrieving, storing, and verifying data and other information;
- choosing the best format for display (e.g. line graphs, bar graphs, tables, pie charts, narrative); and
- ensuring accurate conversion of information into the chosen format.

In acquiring information, recognizing the **structure** of a document or database is fundamental; to retrieve information efficiently and accurately, workers need to be able to find the underlying structure in lists, schedules, tables, indexes, and other documents, and then to use this structure in retrieval. Likewise, they need to develop the ability to organize information according to its logical structure as they display or communicate information--whether graphically, orally, in writing, or through other representational forms.

In the workplace, information is acquired, evaluated, and communicated for specific purposes. It is important to be able to adjust one's search for and processing of information to the **purpose** at hand. To take a simple example, a person should read an article differently if the purpose is to find a particular fact than if the intent is to become familiar with the main issues addressed. Reading the same way regardless of purpose wastes a great deal of time and effort. Similarly, purpose should also guide the way information is presented.

Requirements for Career-readiness

A **telemarketing representative** acquires and evaluates information from customers in order to meet their service-related needs. This includes

asking about their needs or obtaining other service-related information from the customer, accessing and obtaining a computer-generated profile of customer information, and evaluating the accuracy of the information and its appropriateness to specific needs. Elements of information skills implicit in this description include:

- collecting data from a telephone survey;
- keeping records;
- using a computer;
- making an oral presentation;
- developing forms to collect data;
- setting up and using database files; and
- interpreting and evaluating information.

A **blue-collar worker supervisor** organizes and maintains purchase and cost-related information (e.g. purchase requests, invoices, cost data on raw materials). This involves preparing written purchase requests or telephoning requests to vendors and recording order information. In addition, the blue-collar worker supervisor receives materials and invoices, verifies the product received with the invoice entry, and maintains inventory records of all materials received and used. The activities involved include:

- developing forms and collecting data;
- finding information on forms;
- communicating exact information over the telephone; and
- organizing and maintaining records.

A **dental hygienist** communicates information about a patient's condition to a variety of individuals--e.g. doctor, patient, family members, and insurance companies. The hygienist derives the information by checking the patient's dental charts and health records and reading radiograms, and completes patient's insurance forms when requested. Communicating involves:

- acquiring and evaluating data and information;
- developing forms and keeping data;
- organizing and maintaining files;
- communicating information;
- interpreting charts and information; and
- writing a description of events.

A **travel agent** uses on-line computer terminals to provide a variety of customer services (e.g., retrieving customer-request information, planning itineraries, and booking airline tickets). Elements of information skills implicit in this description include:

- using an on-line computer database to access information;
- selecting and evaluating information;
- interpreting information for the customer;

- communicating alternative choices for the customer; and
- ensuring the accurate conversion of information into the chosen format (e.g. hotel and airline tickets).

Examples of Educational Innovation

Traditionally, teachers have given students projects and assignments that involve acquiring, evaluating, organizing, interpreting, and communicating information. In language arts, for example, students do general research, practice library skills, and use reference materials such as dictionaries or encyclopedias. They learn how to differentiate trivial from important information and how to present information in writing projects, like term papers, and in oral presentations of various kinds.

While students are currently getting some exposure in core academic courses to basic strategies for acquisition and management of information, most schools are far from providing the necessary range of information-related experiences that students need to be ready for the workplace. Exhibit 3 illustrates how this might be done at each of three grade levels. Following is a round-up of innovative programs and instructional strategies to help students develop and refine their information-management skills.

An important aspect of information skills as specified by SCANS is document literacy--the use of lists, diagrams, charts, and graphs to acquire, display, and represent information. In a **series of articles entitled "Understanding Documents," Irwin Kirsch and Peter Mosenthal** explore learning to organize, maintain, interpret, and communicate graphic information. They suggest activities designed to increase a student's understanding of the basic structure of forms, tables, charts, and graphs and of how to construct and abstract information from them. Students studying the extent of arms sales to third world countries, for example, may be asked to study a line graph displaying relevant information and to represent the information in a variety of formats (e.g. lists, pie charts, and bar charts), or may participate in a discussion of the advantages and disadvantages of each format. (**SEE:** 1989-1991 issues of Journal of Reading.)

The **Michigan Employability Skills Learning Guide** includes performance/behavior indicators and learning activities for key employability skills, and grounds information skills in workplace examples. In a lesson on the use of labor-market data, for instance, students use such information sources as library resources, guest speakers, organizational job charts, the Dictionary of Occupational Titles, and computers to chart a career in a chosen occupation. Students are evaluated on how well they identify various data sources, describe social and economic factors affecting the labor market, and determine career advancement opportunities. (**CONTACT:** Dr. Paul Stemmer, Michigan Educational Assessment Program, Michigan Department of Education, Office of Technical Assistance and Evaluation, Box 30008, Lansing, MI 48909, (517) 373-8393.)

Determining what information to use is difficult for many students, as shown by the results of the National Assessment of Educational Progress (NAEP) in mathematics for 1990. Many students had adequate math skills yet did poorly on non-routine word problems in which, for instance, extraneous information was given and students had to figure out what information to use. Such findings have fueled a **movement to bring more real-world problems into math instruction.** Marilyn Burns and other math educators suggest that since the information needed to solve these problems is rarely found in tidy packages, students should be required to do exercises where they must collect data from a variety of sources. For example, students might have to take a pile of travel brochures, hotel advertisements, airline schedules, and other pieces of information and determine the most economical vacation for a family of four. This means that the students must figure out what information they need, where and how to find it among the available materials, and where to go to get additional information if necessary. (**SEE:** The State of Mathematics Achievement: NAEP's 1990 Assessment of the Nation and the Trial Assessment of the States, I. V. S. Mullis, J. A. Dossey, E. H. Owen, and G. W. Phillips, National Center for Education Statistics, Washington, D.C., 1991; and About Teaching Mathematics, Marilyn Burns, Math Solutions Publications, Sausalito, Calif., 1992.)

One powerful tool for developing information skills is **computer technology.** At **Mount Edgecumbe High School, Sitka, Alaska,** most computer-learning activities focus on using the computer as a tool for achieving a goal. Students learn about graphics packages, spreadsheets, word processing, and other software. They use graphics to organize and present information, employ word processing packages to record homework assignments on the computer, and use statistical software packages to track their own academic productivity. (**CONTACT:** Larrae Rochelau, Mount Edgecumbe High School, 1330 Seward Ave., Sitka, AK 99835, (907) 966-2201.)

Commercially available educational software packages can be a useful tool for developing students' information skills. For instance, the **National Geographic Society's Kids Network science curriculum** allows elementary school students to practice acquiring, evaluating, interpreting, and communicating information through firsthand exploration of socially significant scientific themes, such as acid rain, solar energy, and the environmental impact of trash. This curriculum was developed by Technical Education Research Centers (TERC). (**CONTACT:** Dr. Candace Julyan, TERC, 2067 Massachusetts Ave., Cambridge, MA 02140, (617) 547-0430.)

At **Foothill Middle School in Walnut Creek, California**--one of many schools that have participated in **Kids Network**--fifth, sixth, and seventh grade science students collected data on acid-rain levels in local water

supplies. The students worked in teams to decide how to collect the data and determine their accuracy and used computers to record and communicate data. Their data, along with those from participating classrooms across the nation, were electronically transferred to a centralized location where Kids Network staffers organized individual classroom and group data and sent them back to participating classrooms via computer. Receiving this feedback, students could compare the findings of their class with those of research teams in other classes. (**CONTACT:** Foothill Middle School, 2775 Cedro Lane, Walnut Creek, CA 94598, (510) 939-8600.)

Database programs are especially valuable for developing students' information skills, and are available to educators in such subjects as geography, history, and social studies. The **World Geography Database**, for instance, provides 51 fields of information (e.g. population, life expectancy by gender, percent of school attendance) on 80 countries. A sample lesson requires students to use the database to explore problems created by conflicting cultures. Students determine information needs, collect and evaluate information, and identify additional information needs and sources when necessary. (**CONTACT:** Dr. Caryn Elder, World Geography Database, 3911 Mill Creek Dr., Annandale, VA 22003, (703) 280-1333.)

Suggestions for Further Reading

Horton, F., Jr., Information Resources Management. Englewood Cliffs, N.J.: Prentice-Hall, 1985.

Lesh, R. and M. Akerstrom, "Applied Problem Solving: A Priority Focus for Mathematics Education Research," in Mathematical Problem Solving, F. Lester, ed. Philadelphia: Franklin Institute Press, 1981.

Lucky, R., Silicon Dreams: Information, Man, and Machine. New York: St. Martin's Press, 1989.

Muson, H., "Schooled for Success," Working Women, January 1992, pp. 33-39.

Noddings, N., K. Gilbert-MacMillan, and S. Leitz, "What Do Individuals Gain in Small-Group Mathematical Problem Solving?" Paper presented at the annual meeting of the American Educational Research Association, Montreal, 1980.

Resnick, L., Education and Learning to Think. Washington: National Academy Press, 1987.

Wainer, H., "Understanding Graphs and Tables," Educational Researcher, January-February 1992, pp. 12-23.

INTERPERSONAL SKILLS

Training in interpersonal skills is now quite common. In Training Magazine's 1991 annual survey of employee training in the United States, 64 percent of companies with 100 or more employees were found to provide interpersonal skills training. More specifically, 69 percent of those providing interpersonal skills training offered leadership training, 61 percent team building, 59 percent training in listening skills, and 53 percent problem solving.

At work, at home, and at play, we continually interact with other people. From birth on, children interact with family members and playmates. Later they have other opportunities for interaction in sports and extracurricular activities. While most parents and educators intuitively recognize the importance of interpersonal skills in succeeding in work and life, the development of these skills typically has not been included in the academic curriculum. Even in extracurricular activities, the full potential for developing interpersonal skills is often lost because no one helps students see what is happening--for instance, what is keeping the group from making progress or what is helping group members work together effectively. In both the academic curriculum and extracurricular activities, increasing students' awareness and development of interpersonal skills is seen by SCANS as essential to preparing them to succeed in the workplace.

Key Dimensions and Concepts

SCANS defined the necessary interpersonal skills in Exhibit 1, and one of the primary interpersonal skills involves participating as a member of a team. In order to be a successful team member, individuals must skillfully:

- share tasks necessary to complete a project;
- encourage each other by listening and responding appropriately to contributions;
- recognize and build on individual strengths;
- resolve differences for the benefit of the group as a whole;
- take personal responsibility for accomplishing goals; and
- responsibly challenge existing procedures, policies, or authorities.

Certain interpersonal skills, such as listening and responding appropriately to others' contributions, are applicable in dealing with any person on any team. Teamwork skills are further enhanced by learning how to recognize and understand others' styles of working and communicating, accommodate cultural differences, and draw on each team member's strengths.

To succeed at another key interpersonal skill, teaching others--whether one-on-one or in small or large groups--requires a worker to:

- help others to apply concepts and theories through coaching or other means;
- recognize training needs;
- convey job information in a way that allows others to see its applicability and relevance to tasks; and
- assess performance and provide constructive feedback/reinforcement.

A highly critical skill as workers interact with customers, co-workers, and other key staff is serving clients/customers. Competent performance requires a worker to:

- listen actively to identify needs and avoid misunderstandings;
- communicate in a positive manner, especially when handling complaints or conflicts; and
- be familiar with relevant resources for satisfying customer needs.

The importance of good customer service cannot be overestimated. Research shows that a typical dissatisfied customer tells at least 10 other people about poor service. Companies that hire servicepeople are likely to pay a great deal of attention to applicants who demonstrate good customer-service skills.

Also important is exercising leadership. Competent leaders are able to:

- make positive use of the rules/values followed by others;
- justify a position logically and appropriately;
- establish credibility through competence and integrity; and
- take minority viewpoints into consideration.

While no clear consensus exists among experts on the specific skills that make for good leadership, the skills most often cited fall into three broad categories: **diagnostic** (e.g. problem-solving and critical and creative thinking), **perceptual** (e.g. communications through good verbal and listening skills), and **behavioral** (e.g. teamwork, team building, negotiation, delegation, motivation, and coaching/counseling). Knowing which leadership style to use will depend on (1) the context of the situation or organization where leadership is required, and (2) the individual's level of mastery in each of the skills categories listed above.

Workers must also be skillful at negotiating to arrive at a decision, which requires them to:

- research the opposition and the history of a conflict;
- set realistic and attainable goals;
- present facts and arguments objectively;
- listen to, hear, and reflect on what has been said;
- clarify problems, when necessary, and resolve conflicts;
- adjust quickly to new facts/ideas;
- propose and examine possible options; and
- make reasonable compromises.

Finally, working with cultural diversity requires:

- understanding one's own culture, the cultures of others, and how cultures differ;
- respecting the rights of others while helping them make needed adjustments in their behavior at work;
- making judgments and decisions on the basis of performance, not stereotypes; and

- understanding the concerns of members of other ethnic and gender groups.

Underlying the various skills listed above, one finds a number of common themes. A fundamental one is **awareness of the interpersonal dimension** of situations in the workplace. In a meeting, for instance, a worker may have knowledge and proficiency in all the impersonal aspects of the task at hand, and yet be unaware of the interpersonal dimension, including the differing personalities and agendas of the other participants and their relationships with one another. This lack of awareness is likely to limit the individual's effectiveness in the meeting and may even cause problems for the overall functioning of the group. A prerequisite to all the interpersonal skills, awareness of interpersonal dynamics, is a necessity for effective workplace functioning.

Besides varying in awareness of interpersonal dynamics, workers differ in what may be termed **perspective taking**--that is, the degree to which they recognize and take into account the perspectives of other people. Perspective taking is essential to most of the interpersonal skills identified by SCANS. In order to teach or train effectively, for instance, one must be able to put oneself in the place of the less-experienced individual and make appropriate judgments about the content and method of the training that will suit the learner's needs. Successful negotiation also requires being able to recognize and take into account the needs, motivations, and perspectives of the other party. Success in serving a customer or client, working with other team members, and showing sensitivity to a co-worker of a different race, cultural group, or gender requires recognizing and taking into account the perspectives of other people--perspectives which may differ substantially from one's own.

Frequently cited as important in dealing with others in the workplace, **flexibility** is another common thread among the various interpersonal skills. Clearly, rigidity is not conducive to good teamwork; each worker must modify his or her own individual preferences, priorities, and workstyles in order to work smoothly with others. Effective leadership requires flexible, creative thinking. In successful negotiations too, one needs to be able to adjust to new information or ideas, devise new options and approaches, and make reasonable compromises.

Underlying most of the interpersonal skills are two other abilities, **problem solving** and **communication**. Problem solving, which requires analyzing an interpersonal situation, coming up with a range of solutions, and evaluating these, is essential in serving customers, participating as a team member, negotiating, and exercising leadership. Moreover, research confirms what we all see around us: proficiency in interpersonal problem solving does not necessarily go along with proficiency in solving impersonal problems. One can be an excellent troubleshooter of computer technology, for instance, and be poor at understanding and resolving problems with one's

co-workers; one can be smart but not "people smart," in other words. Since individuals do not automatically develop interpersonal problem-solving skills from having experience with other kinds of problem solving, educators need to ensure that students have plenty of experience with interpersonal situations, especially of the kinds they will encounter in the workplace.

As for communications skills, it is difficult to imagine a worker being effective in meeting the interpersonal demands of the workplace without being proficient in communications skills, including attentive listening and the ability to convey information, feedback, and opinion in clear and positive terms. Although interpersonal skills are further developed, extended, and honed through workplace experiences, a certain amount is necessary for the performance of jobs at the beginning levels of work, as described in the next section.

Requirements for Career-readiness

A **plastic molding machine operator** works as a member of a team on a production floor in order to identify problems and ensure that everyone works at a consistent speed. In order to perform this task effectively, the machine operator is likely to:

- coordinate activities and movements with other group members to optimize production;
- communicate needs to group members;
- listen and respond to needs of group members; and
- identify, discuss, and resolve problems through cooperative group efforts.

An **accounting/financial analyst** must teach new co-workers office procedures; for instance, how to send a bimonthly memo. This includes explaining the necessary contents of the memo and observing and providing feedback on the new worker's performance. To teach the co-worker how to develop and send these memos, the accounting/financial analyst must:

- explain and/or model desired task-related behaviors;
- convey job information in a way that allows the co-worker to see its applicability;
- monitor performance and provide feedback to help the co-worker effectively apply related concepts to the task;
- establish credibility through competence and integrity; and
- recognize and build on the co-worker's individual learning styles and strengths.

A **customer-service representative** assists customers through such responses to their needs as selecting merchandise, processing merchandise returns, responding to a customer's request for specific merchandise, resolving complaints, and receiving payment for merchandise in either cash or credit

form. Performing this task effectively requires the customer-service representative to:

- actively listen to customers to understand their needs, avoid misunderstandings, and clarify problems;
- communicate in a positive manner;
- resolve conflicts and complaints by evaluating and selecting the most appropriate option; and
- understand how to acquire additional resources to serve the customer, when necessary (e.g. communicate with the supervisor, obtain manufacturer's information for the customer).

A **graphics designer** displays leadership by convincing others that change and evolution are not only necessary but desirable. The designer does this by considering different ways of reaching a goal, and then convincing the client to be open to new concepts. Finally, the designer motivates clients, staff, and vendors to do the best job possible. These activities require the graphics designer to:

- successfully promote new concepts to clients;
- reinforce credibility and competence of staff and organization to client; and
- motivate staff to perform satisfactorily to meet customer's new needs.

A **telemarketing representative** negotiates with customers to close a sale by demonstrating how particular products meet the customers' needs and showing the advantages of the company's products over those of competitors. The representative listens and responds to customer resistance and allows customers to overcome previous resistance without losing face. To perform this job, the telemarketing representative must:

- present facts and arguments objectively to justify marketing the product;
- adjust quickly to new facts/ideas presented by the customer; and
- communicate effectively by listening and responding appropriately.

An **offset lithographic press operator** works with cultural diversity by making sure that expertise and not ethnicity is the determining factor for a work assignment. This includes determining what kind of expertise is needed to perform a job and who has the best qualifications, and asking the most qualified person to perform the job. The press operator must be able to:

- understand the cultural differences among individuals from different ethnic groups;
- base action taken on performance, not stereotypes or personal preferences;

- establish credibility by performing the job with integrity; and
- make positive use of rules.

Examples of Educational Innovation

The **National Academy Foundation curriculum** has a wide range of activities to foster interpersonal skills needed in the world of work. For example, students are divided into groups, and each group invents a game and attempts to write clear and understandable rules. A student from each team is appointed to observe the group process and to note on a "process-observer sheet" various behaviors, such as how the group reaches decisions. When time is up, one speaker from each group explains the game rules to the class, and the class evaluates these for clarity. On the following day, the process observers report to the class the behaviors observed for each group. An observer's comments help to focus each team member's understanding on how his or her behavior affected other group members and the work of the group as a whole. The exercise helps students learn about why organizations have their own sets of rules and regulations, and about the need to follow these regulations in order to succeed. Also, students gain experience in teaching others. (**CONTACT:** Bernadette Toomey, National Academy Foundation, 1155 Connecticut Ave., N.W., 10th Fl., Washington, DC 20036, (202) 296-7132.)

In **another National Academy Foundation example**, students preparing for careers in travel and tourism take part in a training exercise developed by the operations division of a major hotel chain. Students break up into groups and role-play in different situations involving dissatisfied customers, with one person in each group playing a complaining customer and one playing a hotel manager. At the end of the role play, each group reports its solutions, and the class asks follow-up questions and evaluates the solution. Students develop skills in giving and receiving feedback (constructive criticism), and they learn the importance of providing good customer service without diminishing the dignity of individual employees. (**CONTACT:** Same as for preceding example.)

The **New Haven Social Development Program**, one of eight programs developed by Roger Weissberg and his colleagues, is a 27-lesson series for use with sixth graders. Although this program emerged from a preventive mental health background rather than from an educational one, it has helped participants ranging from suburban to inner city kids to sharpen skills for solving interpersonal problems--skills identified by SCANS as essential to workplace success. Using small-group role plays, videotape modeling, cartoon workbooks, class discussion, and other methods, the program teaches a six-step model that gives students a basic framework for interpersonal problem-solving. (**CONTACT:** Dr. Roger Weissberg, Department of Psychology, (M/C) 285, 1009 Behavioral Sciences Bldg., University of Illinois at Chicago, Box 4348, Chicago, IL 60680, (312) 996-3036.)

Role-playing can be taken to a further stage of elaboration. The seventh grade at **Orange Grove Middle School, Tucson, Arizona,** has **simulated companies,** with students as officers. Students gain experience in group problem-solving, decision-making, negotiating, and other interpersonal skills (**CONTACT:** Frank Draper, Systems Thinking Project, Catalina Foothills School District, Orange Grove Middle School, 1911 E. Orange Grove Rd., Tucson, AZ 85718, (602) 575-1234.)

Among the tools that schools find useful in promoting interpersonal skills are educational software simulations marketed for classroom use. An example is **Our Town Meeting, a simulation of local government** intended for use in social studies in grades 5-12. It is designed to be used on one computer with as many as 15 students. Players act as representatives of three agencies engaged in completing projects to benefit an imaginary town. They face dilemmas that mimic the kinds of decisions made in a real community. Students learn about the relative merits of competition versus collaboration among agencies. The program uses the computer as a tool to take care of record-keeping and to coordinate work. "Agencies" take turns at the computer, where they receive information about the proposed project in the form of voter polls, cost estimates, and forecasts of revenue gains. When away from the computer, each group prepares speeches and decides how much money to request during a hearing with the mayor (the teacher). In addition to gaining an increased understanding of the issues confronting a growing community, the students get experience in negotiation and compromise. (**CONTACT:** Tom Snyder Productions, 90 Sherman Street, Cambridge, MA 02140, 1-800-342-0236.)

The **Building on Achievement** program, a collaboration between **Bank of America and Mission High School in San Francisco,** starts with a career-awareness module for sophomores. This module includes such topics as acceptable behavior in the workplace; appropriate dress; self-presentation and resume writing; interpersonal skills; and teamwork. (**CONTACT:** Cindy Fisher or Arno Kracht, Bank of America, 1 South Van Ness Avenue, San Francisco, CA 94103, (415) 241-3214 for Cindy, 3221 for Arno.)

John Hancock Mutual Life Insurance Company and English High School in Boston jointly sponsor the **Hancock On-Premises Education (HOPE)** project to address a gap between students' skills and company requirements for various positions. English High selects 25 students to attend classes taught twice a week by Hancock instructors. Target skills, including communications skills, are embedded in realistic business problems. (**CONTACT:** Winston H. Richie, Jr., Senior Consultant, International Group Department, John Hancock Mutual Life Insurance Company, John Hancock Place, P.O. Box 111, Boston, MA 02117, (617) 572-8670.)

In the past two decades, **cooperative learning and team/small-group formats** have been investigated heavily and have been found to be effective in boosting achievement, motivating students, and raising their self-esteem.

(See "Combining Cooperative Learning and Individualized Instruction: Effects on Student Mathematics Achievement, Attitudes, and Behaviors," R. Slavin, M. Leavey, and N. Madden, Elementary School Journal, 1984, pp. 409-422; and Learning Together and Alone, D. Johnson and R. Johnson, Prentice-Hall, Englewood Cliffs, N.J., 1975.) The positive effects of cooperative learning methods on relationships across racial and ethnic lines and between students at very different levels of academic achievement are also well-documented.

Suggestions for Further Reading

Becker, W. and R. Wellins, "Customer-Service Perceptions and Reality," Training and Development Journal, March 1990, pp. 49-51.

Bennis, W. and B. Nanus, Leaders. New York: Harper & Row, 1985.

Byrnes, J., "Creative Confrontations: The Art of Negotiating," in Trainer's Workshop. New York: American Management Association, 1987, pp. 11-64.

Carnevale, A., L. Gainer, and A. Meltzer, Workplace Basics: The Skills Employers Want. San Francisco: Jossey-Bass, 1990.

Fisher, R. and W. Ury, Getting to Yes: Negotiating Agreement Without Giving In. New York: Houghton Mifflin, 1987.

Graziano, R. and E. B. Silvers, Introduction to Travel & Tourism. New York: National Academy Foundation, 1991.

Green, E., P. Cook, and J. Rogers, "The Need for Interpersonal Skills Training and Supervision," NASSP Bulletin [National Association for Secondary School Principals], Vol. 68 (467), 1984, pp. 23-30.

Mitchell, R., Testing for Learning. New York: The Free Press, 1992.

Slavin, R., Cooperative Learning. New York: Longman, 1983.

Ziegler, S., "The Effectiveness of Cooperative Learning Teams for Increasing Cross-Racial Friendship: Additional Evidence," Human Organization, Vol. 40 (1981), pp. 264-268.

SYSTEMS

We encounter systems in the home, the workplace, the media, and throughout our daily lives. Understanding systems makes it easier to understand the ways in which many of the world's processes take place. SCANS has determined that, in addition to understanding systems, tomorrow's workers need to monitor and correct performance in systems and to design and improve them (see Exhibit 1).

Key Dimensions and Concepts

The first skill, understanding systems, involves basic knowledge of:

- social, organizational, and technological systems; and
- how to operate effectively within them.

Although the SCANS definition of understanding focuses on systems--social, organizational, and technological--that are especially prominent in the workplace, there are many other natural and constructed systems, such as biological, physical, political, and economic ones. From kindergarten on,

there are many opportunities to introduce students to systems. Moreover, developing knowledge of different kinds of systems should help to inculcate the habit of "systems thinking," as discussed below.

To operate effectively in an organization, the worker must know how an organization's structures relate to its goals, which people to ask for information or resources, how to respond to the demands of the organization, and how to function within its formal or informal codes.

The second systems skill, monitoring and correcting performance, has four dimensions:

- distinguishing trends;
- predicting impacts on systems operations;
- diagnosing deviations in systems performance; and
- correcting malfunctions.

The first dimension rests on the SCANS foundation skills of reading, listening, and seeing things in the mind's eye. The last three dimensions--predicting, diagnosing, and correcting--call for **application**. To make predictions and diagnose deviations in a system's performance, one must already have knowledge of how the system works.

The third skill, improving or designing systems, has two dimensions:

- suggesting modifications to existing systems; and
- developing new or alternative systems to improve performance.

Improving or designing systems involves making suggestions, recommending alternative systems designs, and, sometimes, responsibly challenging the status quo. In many situations, good oral and written communications skills, part of the SCANS foundation, are necessary for effectively presenting systems improvements.

Finally, improving or designing systems requires **synthesis**, an insightful combination of previously acquired forms of knowledge. People who can improve or design systems are likely to have in-depth understanding of several similar systems. In addition, they generally have experienced many and varied situations that required monitoring and correcting of a system's performance.

The existing discipline of systems thinking, also known as systems theory or system dynamics, is:

> a framework for seeing interrelationships rather than things, for seeing patterns of change rather than static "snapshots." It is a set of general principles--distilled over the course of the twentieth century, spanning fields as diverse as the

physical and social sciences, engineering, and management. It is also a set of specific tools and techniques, originating in two threads: in "feedback" concepts of cybernetics and in "servo-mechanism" engineering theory dating back to the nineteenth century. (See The Fifth Discipline: The Art and Practice of the Learning Organization, P. Senge, Doubleday, New York, 1990, pp. 68-69.)

From this perspective, to understand systems is to understand dynamic (changing) relationships; to see circular patterns of cause and effect; and to identify hidden, interacting, or multiple causes of observed events and behaviors. Complexity, circular causality, and multiple causality are the hallmark of many natural and man-made systems, some of which are already studied in elementary, intermediate, or high schools, as discussed in the "Examples of Educational Innovation" below. Moreover, the underlying concepts of systems thinking--its "tools"--are useful in the workplace.

Senge describes a mythical electronics company called WonderTech that began with meteoric growth: sales doubled in the first three years. But sales declined in the fourth year, increased in the fifth, declined again in the sixth, and so on. Eventually, the company slid into bankruptcy. The "dynamic system" that lay at the root of the company's problems was as follows: When revenues increased, the sales force was increased, and orders went up. However, when orders went up, a backlog arose and delivery times increased. The long delivery times, after a delay, led to sales difficulty and, eventually, a decreasing number of orders. The WonderTech example illustrates five of the most important underlying concepts of systems thinking:

-- Dynamic complexity. A defining characteristic of a system, dynamic complexity, exists when an obvious, apparently logical action (stepping up advertising) produces a nonobvious consequence (decreased orders), often in another, more distant part of the system.

-- Stocks and flows. A stock is something that accumulates in a system (e.g., orders). Flows act to increase or decrease the stock (e.g., advertising and salespersons affect orders, as do backlogs).

-- Reinforcing processes and positive feedback loops. A reinforcing process is operating when change builds on itself (e.g., orders beget more orders). When the change is positive (increasing number of orders), a positive feedback loop exists.

-- Balancing processes and negative feedback loops. A balancing process is operating when a process (backlog) acts to slow or counter the effects of another process. When the effect is negative (decreasing orders), a negative feedback loop exists.

-- Delay. Decreasing orders did not follow immediately from the increasing backlog, as there were intervening steps--increased delivery time and sales difficulty.

WonderTech's managers reacted to the decrease in orders by stepping up advertising and sales efforts, which made matters worse by increasing the number of orders. If they had **understood** this organizational system (the skill of understanding), they might have **predicted** the impact of their decisions and **diagnosed** the company's problem sooner (the skill of monitoring and correcting). Then they might have taken steps to **improve** delivery time (the skill of improving and designing). To explore this example in greater depth, see Senge's The Fifth Discipline.

Requirements for Career-readiness

A **medical assistant** working in a clinic must understand the system of the organization and know how to operate effectively within it. The assistant needs to:

- understand the organization's ultimate goal (i.e., excellent patient care);
- maintain knowledge of the clinic's organization, including the organizational chart;
- keep up with changes;
- respond to demands of the system when assignment changes occur;
- keep current on which departments in the system handle which specialties; and
- learn which resources outside of the clinic offer patient services.

Implicit in these requirements is a complex organization that continually changes staff assignments and the responsibilities of different departments. To facilitate both initial learning at job entry and later efforts to keep track of changes, it would be most helpful if a high school graduate knew how to draw and interpret an organizational chart.

A **travel agent** must monitor and correct performance to ensure that all customers are well served in a timely manner. Activities at a typical travel agency include:

- monitoring the performance of other travel agents as well as oneself to ensure that all customers are served in a timely manner;
- suggesting alternative routes to complete itineraries;
- correcting one's own mistakes, as well as those of other agents; and
- contacting customers to inform them of any mistakes or changes in travel.

This description indicates that the travel agent needs to develop an effective monitoring process. This could take different forms, such as

surveying customers or periodically reviewing a sample of itineraries. In addition, understanding and tracking trends in travel preferences, costs, and options improve the agent's effectiveness.

A **traffic, shipping, and receiving clerk** may be required to improve or design a system. For example, this job involves:

- determining more efficient ways to stack merchandise;
- observing the processes involved in loading, unloading, and moving merchandise;
- developing ideas for performing these activities more efficiently; and
- sharing the ideas with the supervisor, and implementing changes which ultimately save money or prevent damage to merchandise.

Useful suggestions, as this description implies, often have their origins in careful observation of existing processes. After developing an idea for improving the system, the worker needs to be able to communicate it clearly to others. The ability to draw a diagram that represents the improved system is likely to be helpful.

Examples of Educational Innovation

Learning the underlying concepts of systems thinking holds much promise. Systems thinking can be taught in several ways. First, teachers might attempt to make systems concepts more explicit in subject matter they are already teaching. For instance, when teaching seventh grade students about the U.S.-Soviet arms race, a history teacher might use a diagram to point out the positive feedback loop, stocks and flows, and delay. This would not only acquaint students with systems concepts but also convey the critical feature of circular causality: the build-up of nuclear weapons in the U.S.S.R. led to a build-up in the United States, which eventually led to further increases in Soviet arms, and so on.

Classroom projects can be developed that simultaneously teach systems thinking and include the content of a discipline at the intermediate or high school level. For example, the Pre-College Education Project at the Massachusetts Institute of Technology (MIT) has developed a project that teaches the dynamics of epidemics--how the number of people infected grows over time. To start, students shake hands with other students, allowing them to become infected with New England Regional Disease (NERD). After data on the number of infections are collected, students work cooperatively to formulate hypotheses and make graphic representations of projected outcomes. It turns out that the number of infections increases in an S-shaped manner (relatively slow, then increasing, then slowing again) because: (1) the infection rate increases as the number of infected people increases (a reinforcing process), but (2) the healthy population decreases as more people become infected (a balancing process). Later, students use computers and special software to build

several different models of epidemics. The software allows manipulation of stocks, flows, and other system elements.

In this example, systems concepts are made intellectually explicit. Students are actively engaged in thinking about a biological phenomenon, and they learn cooperatively from each other. If systems concepts in biology are linked to those in other academic subjects, students have a framework that can give new meaning and cohesion to their educational experiences. (**SEE:** Teaching System Dynamics: Looking at Epidemics, W. Glass, 1991, available from Lee Stuntz, Director, Creative Learning Exchange, 1 Keefe Rd., Acton, MA 01720, (508) 287-0070; **CONTACT:** Nan Lux, Pre-College Education Project, System Dynamics Group, Massachusetts Institute of Technology, E40-294 MIT, Cambridge, MA 02139, (617) 253-1574.)

Some schools go a step further and link systems projects to the world of work. These innovative schools have developed integrated simulations that help students to develop and simultaneously use a range of foundation skills and all five of the SCANS competencies.

In one such school, **Orange Grove Middle School, Tucson, Arizona,** teachers of different subjects within a grade share the same planning period, and classes are scheduled in blocks so that students can carry out their integrated simulations. For example, seventh grade students who have just completed a two-month study of geology in science and the study of fractions in math are divided into six simulated companies that mine and sell aluminum and copper. The officers of each company must decide which mines to lease and which to keep in production (drawing upon students' knowledge of geology). The officers also decide how to allocate operating capital among production, public relations, marketing, pollution control, and R & D (drawing upon students' math skills, including fractions). Supply, demand, and prices for the two metals vary in a systematic way with the decisions of each company, which is networked with the other companies through a file server.

Students also learn systems skills in **another Orange Grove project, New State Park.** In this project, participating students research park philosophy, park management, land management, recreation theory, social systems, geography, ecological community theory, and politics. They then use their newly acquired knowledge to design a new park with a $100,000,000 budget. The park had to: include land required by the park's charter, yet avoid a threatened lawsuit by not desecrating nearby Indian burial sites; and be attractive to users, yet not cause appreciable environmental degradation. As students designed the park on a computer, they used a spreadsheet to aid fiscal accountability and a model of park development/environmental degradation to aid design accountability. (**CONTACT:** Frank Draper, Systems Thinking Project, Catalina Foothills School District, Orange Grove Middle School, 1911 E. Orange Grove Rd., Tucson, AZ 85718, (602) 575-1234.)

In **Montgomery County, Maryland**, some students are **learning vocational trades through businesses** set up as nonprofit foundations by the public school system and the county's business and professional community. The Construction Trades Foundation is a mini-construction firm and the Automotive Trades Foundation is a mini-car dealership. (**CONTACT:** Carolyn Darne, Montgomery County Students Vocational Trades Foundations, 12501 Dalewood Drive, Silver Spring, MD 20906, (301) 929-2190.)

Another helpful resource on school-based systems-integration projects is the **Creative Learning Exchange**. It is a database and information exchange for educators throughout the country. (**CONTACT:** Lee Stuntz, Director, Creative Learning Exchange, 1 Keefe Rd., Acton, MA 01720, (508) 287-0070.)

Suggestions for Further Reading

Draper, F. and M. Swanson, "Learner-Directed Systems Education: A Successful Example," System Dynamics Review, Vol. 6 (1990), pp. 209-213.

Forrester, J., "System Dynamics--Adding Structure and Relevance to Pre-College Education," in Shaping the Future, K. Manning, ed. Cambridge: MIT Press, 1992.

Hopkins, Pamela Lee, Simulating "Hamlet" in the Classroom, 1991. Available from author, Desert View High School, 4101 E. Valencia Road, Tucson, AZ 85706.

Katz, D. and R. Kahn, The Social Psychology of Organizations. New York: Wiley, 1978.

Lannon-Kim, C., "Revitalizing the Schools: A Systems Thinking Approach," The Systems Thinker, Vol. 2 (5), 1991.

Senge, P. and C. Lannon-Kim, "Recapturing the Spirit of Learning Through a Systems Approach," School Administrator, November 1991, pp. 8-13.

TECHNOLOGY

Both our economic well-being and the quality of our lives depend, to a significant degree, on an ability to understand and use technology--computers, machines, and other tools. The SCANS definition of technological competence requires developing the ability to **understand** computers, machines, and other tools and to **use** them to solve problems. The definition includes the skills of selecting technology, applying technology, and maintaining/troubleshooting technology (see Exhibit 1).

Key Definitions and Concepts

The first skill is selecting technology. It involves judging which set of procedures, tools, or machines, including computers and their programs, will produce the desired results. Among the dimensions of this skill are:

- determining desired outcomes and applicable constraints;
- visualizing the necessary methods and applicable technology; and
- evaluating specifications.

Selecting appropriate technology to fit the situation is a form of problem solving. The desired outcomes and applicable constraints define the problem, while the solution is the procedure, machine, or tool chosen to get the job done. Typically, a worker arrives at a solution via a thinking process that involves evaluating machine specifications or visualizing methods and applicable technology--or both. This kind of technological problem-solving depends on experience with particular computers, programs, machines, tools, or procedures.

The second technology skill, applying technology to tasks, involves using computers and other kinds of equipment to achieve the desired results. It is demonstrated by a person who:

- understands how different parts of machines interact and how machines interact with broader production systems;
- installs machines, including computers;
- sets up machines or systems of machines efficiently to get desired results;
- accurately interprets machine output; and
- detects errors from program output.

The first dimension is most important because it implies understanding of the overall intent or purpose of the technology. Without this understanding, installation, set-up, and interpretation of output are apt to be faulty. The last dimension is similar to the SCANS skill of diagnosing deviations in the performance of a system.

The third skill, maintaining and troubleshooting technology, involves preventing, identifying, or solving problems in machines, computers, and other technology. It includes:

- identifying, understanding, and performing routine preventive maintenance and service on technology;
- detecting more serious problems;
- generating workable solutions to correct deviations; and
- recognizing when to get additional help.

In the past, technical skills were taught to young people who enrolled in vocational education courses because they were not bound for a four-year college. In today's rapidly changing workplace, technology education is essential for all students, regardless of where they are bound after high school, and is the responsibility of all educators.

Requirements for Career-readiness

A **graphics designer** must select technology, determining which tools could best accomplish the work required to meet the goals of a project. Among the activities to be performed are:

- reviewing the customer's ideas (e.g. by reading a description of project requirements);
- evaluating the graphics methods or tools to be used (e.g. by reading technical specifications);
- choosing a particular tool or method to produce rough drafts;
- using this tool or method to produce rough drafts; and
- looking at rough drafts and alternative methods to decide which is the best technology for the customer's project.

At the heart of these activities is the ability to read a requirements description and technical specifications and come up with a match. In essence, the graphics designer is engaging in technological problem solving.

A **hotel account executive/sales executive** applies technology nearly every day by:

- using a computer to check reservations;
- using a computer to reserve the required number of rooms and assign room numbers to an incoming group;
- activating a direct computer link to a credit bureau to qualify new customers;
- using the word processing function of a computer for correspondence and memos; and
- using a computer to check the occupancy rate for a monthly sales meeting (e.g. with a spreadsheet).

The first activity above requires knowledge of the hotel's computerized reservations system. For all of the activities, the account executive needs to be able to read and follow the instructions in various software manuals; clearly, the foundation skill of reading is important. The task description also points to the value of prior educational experiences that have involved word-processing technology.

A **food service manager** maintains and troubleshoots technology by:

- performing preventive maintenance on a dishwasher, ensuring that the equipment is cleaned, sanitized, and properly reassembled each week;
- locating the source of problems and starting repairs; and
- knowing when he or she is incapable of fixing the problem and when to contact a maintenance specialist.

In this work setting it is important to understand and follow written maintenance and repair instructions, since relying on outside help would be costly and cause delays in the operation. The ability to understand these instructions depends, in turn, on reading skills and understanding how parts of the machine interact (part of the skill of applying technology).

Examples of Educational Innovation

The SCANS agenda for developing technology skills responds to the changing nature of technology education, with modern technologies of information and communications, manufacturing, biotechnology, space, and many other fields. The changes in technology education have been described as follows:

> Several years ago we [technology educators] called our area of study industrial arts. It was characterized by drafting machines, wood lathes, and table saws. Construction of tool boxes, bird houses, and bookshelves were a mainstay of the field. Today, technology education is the appropriate name, and computer-aided drafting, computer-aided manufacturing, laser photography, and robotics are fundamental. We spend more time with silicon chips than we do with wood chips. ("Technology Education," M. Oaks and M. Pedras, The Technology Teacher, February 1992, p. 11.)

The shift from wood chips to silicon chips occurred in two phases. In the first phase, an emphasis was placed on students learning about computers and other new information technology. In the emerging second phase, students are learning to use computers in technological problem-solving and design activities. Examples of a technological problem-solving activity and a design activity follow; both involve computers.

In the **Fort Worth Independent School District in Texas**, new high-technology labs are part of the curriculum in high schools and middle schools, and students are exploring applications in such areas as robotics, computer-aided manufacturing, pneumatic structures, and rocketry. For example, students have created, through a problem-solving process, a computer-aided manufacturing loop. It activates a robot to load a piece on a conveyor belt, unloads the piece with a pneumatic device (after the piece passes an electric eye that tells the computer the piece is ready to be unloaded), takes the piece to a machine to be drilled, and finally returns the piece to the robot. (**CONTACT:** Dr. David Greer, Program Director, Technology Education, FWISD, 3210 West Lancaster, Fort Worth, TX 76107, (817) 878-3737.)

At **Lakeland Regional High School in Wanaque, New Jersey**, design activities begin with a "real-life" problem that demands goal-directed technological creativity. For instance, students worked for two years to design a replica of a 19th-century water wheel for a nearby historical park. After researching the historical background of the wheel, water wheels as a source of power, and methods of constructing water wheels, students made drawings and templates, designed pieces using computer graphics, selected suitable materials, tested pieces, and eventually built a full-size working replica of the wheel. (**SEE:** "Restoring the Power," J. LoCascio,

Technology, Innovation and Entrepreneurship for Power, January/February 1990, pp. 11-15.)

Besides these changes in scope and content, in many places technology education is becoming an integral part of the total school curriculum for all students. **New York State**, for instance, requires every student to complete, by the end of eighth grade, a one-unit **course called Introduction to Technology**. Through learning activities that last several weeks each, the course develops skills in solving technological problems. In one activity, students explore the nature, function, and control of rocket systems and subsystems. Model rockets are built and tested, and adjustments are made in order to optimize flight performance. (**SEE:** Technology Education: Introduction to Technology, University of the State of New York and the State Education Department, Albany, 1990.)

Coherent sequences of courses called **tech-prep curricula** are being developed to link two years of postsecondary technical education with a systematic course of study in high school--with either a four-year course ("4 + 2") or a two-year course ("2 + 2"). The students of today and tomorrow need more and more postsecondary technical education to remain competitive in the workplace, even though many of these students are not pursuing a four-year college degree. Tech-prep curricula are helping to reduce the number of students with no career goal in mind who take courses indiscriminately, try to accumulate enough credits to graduate, and later often enter technical or trade schools with inadequate backgrounds in math, science, technology, communications, and business.

Some of the courses that have been developed for tech-prep students are also appropriate for students preparing to attend four-year colleges. For example, **Principles of Technology** is an award-winning laboratory-based course in applied physics. Its aim is to produce technically literate students with a solid understanding of physics concepts in mechanical, fluid, electrical, and thermal energy systems. These concepts include force, work, rate, resistance, energy, power, force transformers, momentum, waves and vibrations, energy convertors, transducers, radiation, light and optical systems, and time constants. Principles of Technology is accepted as a pre-college laboratory course by MIT and Georgia Tech.

Educators in **Richmond County, North Carolina** have developed a successful **"4 + 2" program** with a strong core of academic and vocational/technical courses. Academic courses include Algebra I, Geometry, and regular or precollege English; vocational/technical courses include Principles of Technology, Electronics, Technical Health Occupations, and Computerized Accounting I and II. In the fall of 1986, 25 percent of Richmond County students were enrolled in precollege and 75 percent in general/vocational studies. By fall 1990, only 37 percent of the students were enrolled in general/vocational studies; the balance were in precollege (32 percent) or tech-prep (31 percent). The percentage of

students enrolling in Algebra I rose from 47 percent in 1986 to 75 percent in 1990. SAT scores of graduating seniors increased 47 points over the same period, while the dropout rate decreased. (**SEE:** "Opening the Door to a Brighter Future in North Carolina," D. James, in Tech Prep Associate Degree: A Win/Win Experience, D. Parnell and D. Hull, eds., Center for Occupational Research and Development, Waco, Tex., 1991; **CONTACT:** Myrtle D. Stogner, Director, N.C. Tech Prep Leadership Center, P.O. Box 1189, Hamlet, NC 28345, (919) 582-7187.)

In **Austin, Texas, Leander High School and Austin Community College** (ACC) have established an exemplary **"2 + 2" tech-prep program.** To prepare Leander students for entry into Instrumentation and Control Technology, an ACC advanced-technology sequence, juniors and seniors take Principles of Technology I and II; Algebra or Geometry; Semiconductors; Technical Graphics; Using Personal Computers; and Electricity, A.C. and D.C. (**SEE:** Tech Prep: Preparing Students for Success in Postsecondary Technical Curricula, Center for Occupational Research and Development, Waco, Tex., 1988.)

In addition to these examples illustrating the changing nature of technology education, several examples show how changes in this area are being reflected by the infusion of new technology into elementary and secondary classrooms. Merely increasing students' access to computers and multimedia tools such as videocameras, videodisks, scanners, and sound digitizers may help to improve their technological competence. Beyond that, however, students need opportunities to use and think with technology. The project manager for Apple Classrooms of Tomorrow, Dr. David Dwyer, expresses it this way:

> When we think about classrooms we think of them as places where kids are active players, engaged in inquiry into problems that are meaningful and relevant to them. We see teachers as facilitators in this process--collaborators in knowledge-building activities, architects of learning contexts in which children pursue challenging tasks over meaningful amounts of time, inspired and encouraged by their mentors and coaches. (P. 4 in "Technology and Education Reform," David Dwyer, 1991, unpublished paper available from the author--see below.)

The **Apple Classrooms of Tomorrow** project is a research and development collaboration among public schools, universities, research agencies, and Apple Computer. Its purpose is to expand the role of technology in the classroom beyond the simplistic notion of computers as teaching machines to technology as a thinking tool. (**CONTACT:** David Dwyer, Project Manager, Apple Classrooms of Tomorrow, Apple Computer, Inc., 20525 Mariani Ave., MS 76-5E, Cupertino, CA 95014, (408) 974-4574 or 996-1010.)

Another powerful idea in infusing technology into classrooms is the view that technology can serve as a catalyst for integrating different subjects and skills. At the **Marin School for Integrated Studies**, an experimental high-tech program for high school students in **San Anselmo, California**, the aim is to show that all disciplines are integrated in the real world. In a typical project, teams of students studied the problems of drought in Marin County from a variety of angles. In English class they read Dune, a science fiction novel featuring society's reaction to lack of water. In biology they studied drought-resistant plants and used graphics software to diagram the plants' DNA. One team grew the plants in a garden they designed with special software. Other teams measured water usage in the area and surveyed residents' attitudes toward water conservation. (**SEE:** "Schooled for Success," H. Muson, Working Woman, January 1992, pp. 33-39.)

There are many ways to provide opportunities for students to use and think with technology. The best of these involve extended projects that teach not only technology skills but also other SCANS skills, such as information and interpersonal skills. A four-week **technology/community involvement program** for high school seniors in **Anoka, Minnesota** is a good example. Student teams searched three comprehensive databases for information needed to analyze such issues as preservation of wetlands and health care for the elderly. They discussed public policy related to these issues, and with the aid of computers, developed a paper including their recommendations and supporting them with data, graphs, and maps they designed. The best papers were selected for formal presentation to the State legislature.

The Anoka project is included in **Images in Action**, a round-up of examples of successful infusion of technology into classrooms. (**SEE:** Images in Action, National Foundation for the Improvement of Education, Washington, D.C.)

Many State education agencies are actively involved in **school reform** programs aimed at enhancing technology skills. The **Arkansas Education Department**, for example, is implementing several youth demonstration projects based on a work-based learning model. In addition, a new tech-prep curriculum in the State's high schools consists of courses in technology education (particularly computers), keyboarding, personal and family life skills, career/occupational orientation, applied academics, and workplace readiness. (**CONTACT:** Jean McEntire, Associate Director, Vocational and Technical Education Division, State Education Department, 3 Capitol Mall, Luther S. Hardin Building, Little Rock, AR 72201, (501) 682-1040.)

A notable school-business partnership for improving technological competence is the **COMSAT/Jefferson Alliance**. In 1989, the Communications Satellite Corporation (COMSAT) entered into a $1.1 million, 5-year alliance with neighboring Jefferson Junior High School of

Washington, D.C. to establish a school of distinction in mathematics and science. The purpose--very much in tune with SCANS--is to put the learning of basic skills, such as math computation and problem-solving, into the context of broader competencies and real-world technological problems. (**CONTACT:** Robert W. Hunter, Director of Corporate Communications, COMSAT, 950 L'Enfant Plaza, S.W., Washington, DC 20024, (202) 863-6000.)

Suggestions for Additional Reading

DeLuca, V., "Survey of Technology Education Problem-Solving Activities," The Technology Teacher, February 1992, pp. 26-29.

Dillon, D. and C. Droessler, "Information Gathering by Telemetry," TIES, November-December 1989, pp. 11-15.

Shannon, M., "Why Technology Education Should Be Called Design and Technology Education," TIES, November-December 1989, pp. 41-43.

TIES (Technology, Innovation, and Entrepreneurship for Students), a monthly magazine that is published by Drexel University, Philadelphia, Pa., and that provides teachers with up-to-date resources for developing a hands-on, problem-solving technology-education curriculum. (Contact Scott Anderson at (215) 895-1680.)

"What Decision-Makers Need to Know about Technology Education," TIES, March-April 1991, pp. 10-13.

Wright, J., "Technology Education Laboratories of the 90's," TIES, March-April 1991, pp. 14-18.

IMPLEMENTING SCANS: First Lessons

By Ann S. Meltzer, Thomas G. White, and Nancy S. Matheson
(see Authors' Note for previous article)

The June 1991 SCANS report, What Work Requires of Schools, began with an open letter to parents, employers, and educators. It invited them to join in the conversation about work and school. It further suggested that, instead of taking the Commission's word, they should test the conclusions of the report in their homes, schools, and places of business. This suggestion was reemphasized in the SCANS final report, Learning a Living: A Blueprint for High Performance, and in SCANS Blueprint for Action: Building Community Coalitions, which profiles more than a hundred SCANS-related examples furnished by the Department of Labor's 10 regional offices.

This paper presents some in-depth examples of State and local efforts to strengthen the connection between school and work. Many of these efforts were initiated before publication of the SCANS reports, yet their aims, methods, conclusions, and outcomes often reflect SCANS principles. We therefore regard them as preliminary versions of the tests that were called for. We believe they contain valuable "first lessons" in implementing SCANS ideas.

Ten programs or projects are featured, with descriptions, contacts, and information on any outcomes to date. These efforts are characterized by broad involvement of the business community, governmental and educational agencies, and the community at large. Another distinguishing feature is comprehensiveness: they all involve both an identification of the skills students need in the workplace and the teaching or assessing of the skills identified.

The 10 efforts are America's Workforce: A Vision for the Future (multiple sites); Career Preparation Validation Study (N.Y.); Critical Skills Foundation (Wheaton, Ill.); Employability Skills Task Force (Mich.); Project C^3: Communities, Corporations, Classrooms (Fort Worth, Tex.); IndianaPLUS: The School-to-Work Connection (Evansville, Fort Wayne, Indianapolis, South Bend, Terre Haute); Northwest Regional Educational Laboratory (Portland, Ore.); the applied technology program in the Pittsburgh (Pa.) Public Schools; Project of the States (Conn., Kan., Mich., Neb., Ore., Wash.); and THE VITAL LINK (Fort Worth, Tex.; Orange County, Calif.; State of New Jersey).

America's Workforce: A Vision for the Future (Multiple Sites)

The U.S. Department of Labor (DOL) is promoting the development of a nationwide network of community partnerships for excellence in learning. The purpose of the partnerships is to involve local government, business, and education leaders in efforts to develop youth-apprenticeship models that consist of some combination of worksite and school-based learning. A six-hour "model" symposium has been designed by the Instructional Systems Association to stimulate formation of such partnerships across the country.

Taking part in the symposium will enhance participants' awareness of workforce-quality concerns and inform them of resources available, including material on SCANS, America 2000, and school-to-work transition projects funded by DOL. The symposium package will include a 20-minute video called "America's Workforce: A Vision for the Future," which is to be followed by small-group discussions about the skills needed in the workplace of the future and about actions that can be taken to ensure learning of these skills. A second video included in the package, "Winning Combinations," depicts actions that some communities have already taken.

CONTACT: Victor J. Trunzo, Training Policy Analyst, Office of Work-Based Learning, Employment and Training Administration, U.S. Department of Labor, Rm. N-4649, 200 Constitution Ave., N.W., Washington, DC 20210, (202) 219-5281.

Career Preparation Validation Study (New York State Education Department)

The Anderson Committee appointed by the New York State Board of Regents was convened in June 1989 to review standards for recipients of local or Regents diplomas. The aim was to ensure that diploma recipients were prepared for employment and/or postsecondary education.

The Anderson Committee's work culminated in a final report to the Board of Regents in January 1990. This report recommended that performance expectations for students in the basics (language arts and mathematics) be raised and that students be introduced to a group of skills that had not been adequately addressed in school curricula--the expanded basics.

Some skills in this group are related to the SCANS skills and competencies. These expanded-basics skills (with the related SCANS skill or competency in parentheses): are interpersonal skills (interpersonal skills), working as a team member (interpersonal skills), using information systems (information), reasoning (thinking skills), setting priorities (resources), personal work skills and behaviors (personal qualities), and personal and civic responsibility (personal qualities).

Two skills-validation studies were planned in order to identify the skill levels needed by graduating high school students for employment and/or postsecondary study. One of these, the Career Preparation Validation Study, was completed during the fall of 1990 to verify the skill levels necessary to perform various jobs not requiring a four-year college degree. A second study of the competency levels required for successful college preparation has not yet been completed.

The State Education Department worked with a variety of business and education organizations during the course of the Career Preparation Validation Study. With the assistance of curriculum specialists throughout the State, the Department developed a scale to rate the level of competence required of job holders in the basics and expanded basics. The six-point scale ranged from one (lowest observable demonstration of performance of a skill outcome) to six (outstanding performance of a skill outcome). Teachers and educational representatives observed and interviewed 1,400 jobholders from 300 different business settings to collect information on skill-level requirements of entry-level workers. Efforts were made to ensure that the sample of jobholders represented the diversity of the State labor market.

The level of basics and expanded basics required by New York's entry-level workers was compared with the level of these skills that is measured in State tests and required in K-12 State syllabi (e.g. for language arts and mathematics). Teachers studied K-12 syllabi to determine the extent to which syllabi requirements matched competency levels for each of the basics and expanded basics skills. Results of the comparison for the expanded basics are of special interest to those interested in teaching SCANS skills. As shown below, the level of competence required of entry-level workers in most of the expanded basics was above the level required in State syllabi.

- Over one-half of entry-level workers required a higher level of competence at interpersonal skills, working as a member of a team, setting priorities, and personal work skills and behaviors than was addressed in existing State syllabi;

- Approximately one-third of entry-level workers required a higher level of competence at reasoning and personal and civic responsibility than was addressed in existing State syllabi; and

- Approximately one-fifth of entry-level workers required a higher level of competence at using information systems than was addressed in existing State syllabi.

CONTACT: Helen Branigan or Richard Jones, State Education Department, Office of General and Occupational Education, One Commerce Plaza, Rm. 1623, Albany, NY 12234, (518) 474-4806.

The Critical Skills Foundation (Wheaton, Illinois)

Charles Jett, a partner of the consulting firm of Ward Howell International in Chicago, Ill., has designed a program to enable high school students to practice and learn the "critical skills"--the skills common to all kinds of careers and most vital to employers--as well as the foundation skills and competencies articulated by SCANS. This program has led to the establishment of an operating foundation to develop and disseminate curricula to businesses and educational institutions.

In response to requests from students in major MBA programs, Jett conducted extensive research in the mid-1980s by collecting approximately 900 position descriptions--30 descriptions for each of 30 different first-level "capstone positions" from the files of national executive-search firms. From this database, he prepared a detailed "skill mosaic" for each of the capstone positions that gives students a clear picture of the kinds of skills they need to develop in order to successfully manage their careers.

Through comparing the descriptions of the 900 positions to determine the skills they have in common, these critical skills emerged:

- Communications--the ability to exchange information and ideas with others through writing, speaking, reading, or listening;
- Analytical--the ability to derive facts from data, findings from facts, conclusions from findings, and recommendations from conclusions;
- Production--the ability to take a concept from an idea and make it real;
- Teamwork--the ability to be an effective member of a productive group; and
- Priorities/Time Management--the ability to determine priorities and manage time commitments and deadlines.

Out of Jett's research emerged the Critical Skills Foundation, which was formed to facilitate the development and dissemination of curricula and projects in which students may practice the critical skills in the environment of a real-world business partner. The Foundation has developed two different approaches to teaching the critical skills:

Field Studies. These are modest projects designed for students to use in consulting for small businesses. They require the students to meet with the businesses; articulate problems and issues; break problems down into specific work steps; develop a work plan; determine data-gathering needs;

collect data; analyze them; arrive at findings, conclusions, and recommendations; and present the results orally and in writing. SCANS-related projects have been conducted for banks, heating/air-conditioning companies, medical practices/clinics, franchisors, and retailers. Projects are being developed for community-based nonprofit organizations and K-8 classroom teachers.

The Critical Skills Foundation has developed "Field Studies and Applied Learning for High School Students," a guidebook for schools and potential business partners. It provides detailed instructions for conducting field studies with small businesses, suggests projects consistent with SCANS and critical skills, and describes qualities that businesses look for in selecting student field-study teams.

The Foundation has also developed a curriculum that prepares students for field studies. It introduces and teaches the critical skills over a four-semester period during the junior and senior years of high school. Further courses include specific field-study projects.

Applied Learning/Cooperative Education. The Critical Skills Foundation conducted a project to incorporate the SCANS foundation skills and competencies into vocational/cooperative education in the Wheaton (Ill.) public high-school system. The project involved developing lists of specific projects for the skills and competencies in each of four different business sectors--office, retail, restaurant/food-service, and medical practices/clinics. The applied-learning approach enables cooperative-education partners to teach the SCANS skills and competencies in a real-world environment, and facilitates small-business participation by using standardized curricula.

Recently, the Critical Skills Foundation initiated educational-outreach projects with the American Medical Association and with national retailer Wal-Mart, Inc. Each case involves designing an educational module that will develop the SCANS competencies and the critical skills on a nationwide basis. The educational module for medical practices/clinics is being field-tested, and the retail module is being readied for field-testing in early 1993.

CONTACT: Charles C. Jett, Critical Skills Foundation, 1113 North Irving St., Wheaton, IL 60187, (708) 682-5388; or c/o Ward Howell International, Inc., 20 N. Wacker Dr., Suite 2920, Chicago, IL 60606, (312) 236-2211.

Employability Skills Task Force (State of Michigan)

In November 1987, the Governor's Commission on Jobs and Economic Development convened the Employability Skills Task Force to identify the

skills that Michigan employers view as important to success in the modern workplace. The task force represented a diverse group of business, labor, and education leaders from across Michigan, and has resulted in a better transition from school to work for the State's youth.

The results of the task force's efforts are divided into two major phases: (1) arriving at skills definitions that both employers and educators can work with, and (2) going into the schools to apply these definitions to student learning. The first phase, which has been completed, consisted of defining the important skills (with a focus on both college-bound and noncollege-bound students), developing the Employability Skills Profile identifying the skills looked for by Michigan employers, and surveying State employers and educators to validate the employability skills defined and identified.

The task force defined important skills in three categories, and skills in the Employability Skills Profile correspond to these categories. The categories, with profile skills in parentheses, are:

- **Academic skills** such as skills in communications, comprehension, quantitative learning, critical thinking, science, and technology. (Understanding spoken language and speaking in the language in which business is conducted; reading written materials, including charts, graphs, and displays; writing in the language in which business is conducted; and thinking and acting logically by using the steps of the scientific method--identifying problems, collecting information, forming opinions, and drawing conclusions).

- **Personal management skills** such as setting goals and implementing strategies to achieve them, identifying and acting upon personal values, and demonstrating self-discipline. (Demonstrating in the workplace such personal values and ethics as honesty, fairness, and respect for others; exercising a sense of responsibility; demonstrating self-control; and identifying and suggesting new ideas.)

- **Teamwork skills** such as skills in interpersonal relationships, organization, negotiation, creativity/innovation, and leadership. (Identifying with the goals, norms, values, customs, and cultures of the work group; using a team approach to identify problems and devising solutions; functioning in changing work settings and groups; and showing sensitivity to the needs of women and ethnic and racial minorities.)

Following the definition of skills and the development of the profile, nearly 3,000 Michigan employers were surveyed to validate the employability skills, and a modified questionnaire for the same purpose was used to survey about 1,400 teachers and 433 high school principals.

The survey of employers found that academic skills, such as oral and written communications, reading, and basic mathematical computations, were considered important by a wide range of employers. Personal management skills, such as responsibility, integrity, dependability, respect for others, enthusiasm and pride in work, and teamwork skills--including communicating and working cooperatively with others, working effectively within the organization, and being receptive to improved ways of working--also were judged to be important employee characteristics.

The responses from teachers and principals were similar to the employer responses. One exception was that teachers emphasized academic and career-development skills more than the employers and principals did.

Employers were also asked to generate a list of the essential skills needed by present and future employees in light of the technological changes affecting the workplace. Computer skills topped the list, followed closely by communications skills (both verbal and written).

The Employability Skills Profile formed the basis for this development. Local school systems that expressed an interest were supplied with the employer survey and were encouraged to perform supplementary local surveys.

The second major phase of the task force's results--application of skills definitions in the schools--began in 1988, when the Michigan State Board of Education appointed some task-force members to serve as an advisory group to develop an employability-skills assessment for use in the State's high schools. The task force's major recommendation was development of an employability skills portfolio, a folder containing evidence of a student's employability skills in academics, personal management, and teamwork.

Student and parent portfolio information guides were created by the State to assist in the development of individual portfolios. The Michigan Department of Education provided training and technical assistance, and awarded grants totalling $147,200 to participating school districts in 1991 to cover the cost of materials and the training support needed to implement local portfolio projects.

The employability skills portfolio was pilot-tested in 22 school districts during the 1990-91 school year. Participating ninth grade students created and updated a portfolio of activities and experiences that demonstrated their learning of the skills identified by the Employability Skills Task Force. Parents and teachers were an integral part of portfolio-development activities, and local schools were given flexibility in guiding a student toward the focus and contents of her or his portfolio. The portfolio was treated as an important lifelong-development tool for all students, regardless of their future education/employment plans, and was viewed as a centerpiece for school improvement.

A number of issues arose as the schools introduced portfolios into the scope of their educational activities. A logistical issue was where to keep the portfolios. Another issue was how to ensure that stakeholders would buy into the portfolio process. Although the Advisory Board recommended a public relations campaign to encourage employers to request portfolios from potential employees, schools indicated they wanted more training and more time to develop and test the portfolio concept.

In the 1991-92 school year, there will be an intensive effort to familiarize local employers with the portfolio concept. The second year of portfolio implementation will also involve intensive research and development efforts to enable pilot sites to refine the process--efforts such as a compendium of locally-generated portfolio ideas. In addition, there are plans for a series of "train the trainer" sessions in which key school contacts throughout the State will be familiarized with the employability skills portfolio.

Another Michigan Department of Education initiative stemming from the Employability Skills Task Force is the department's funding of the Vocational-Technical Education Curriculum Project. This project culminated in the 1991 development by curriculum teams of a set of student Performance/Behavior Indicators (PBI)--specific skills a student should master within the three employability-skills categories. Finally, learning activities were generated for each of the PBIs by an outside developer, Educational Data Systems, Inc.

CONTACT: Dr. Paul Stemmer, Michigan Educational Assessment Program, Michigan Department of Education, Office of Technical Assistance and Evaluation, Box 30008, Lansing, MI 48909, (517) 373-8393.

Project C³: Communities, Corporations, Classrooms (Fort Worth, Texas)

The Fort Worth Independent School District is transforming the city's schools into high-performance learning centers through Project C³, a wide-ranging partnership among these schools and 300 community businesses. The many facets of this partnership, which is one of the nation's best examples of putting SCANS into practice, are based upon its January-November 1990 in-depth analysis of the jobs in the Fort Worth metropolitan area.

The major facets of Project C³ are the Applied Learning initiative, vocational education renewal, Equity 2000, THE VITAL LINK, transformation of student assessment, and the High Performance Schools venture. We will explore each of these facets in detail (with the exception of THE VITAL LINK, the subject of a separate section on pp. 72-74).

We begin, though, with a look at the job analysis which laid the groundwork for these various initiatives. Project C³'s job-analysis component identified the level of skills proficiency that would be required to perform a set of tasks commonly associated with a wide variety of jobs in the Fort Worth area.

In the job analysis, more than 3,000 employees of over 300 Fort Worth businesses analyzed 791 jobs. Several employees in the same positions in the same company worked in teams to identify important tasks for their jobs, then described the detailed subtasks required to complete each task. Finally they rated the level of proficiency for each skill required to complete each task, with their ratings taken from among five categories of proficiency level--rudimentary, basic, intermediate, adept, and advanced.

The following is an example of the most rudimentary and advanced proficiency levels for speaking and listening, one of the seven major skills areas identified by the project (the others are reading, mathematics, writing, computer literacy, reasoning, and originality/creativity):

- **Rudimentary:** ability to ask and answer questions and to follow two or three sequential instructions, e.g. ask an instructor for directions, repeat a message, or answer simple oral-exam questions.

- **Advanced:** ability to conceive and develop ideas about a topic, to choose and organize related ideas, and to present them to a group in a compelling fashion.

Results of the job analysis indicated that 28 percent of the jobs analyzed required some level of postsecondary education. Also, 58 percent of the jobs analyzed required at least an "adept" level of proficiency in at least one skill area, and 39 percent required this level in more than one area. Higher skills requirements were not confined to jobs requiring postsecondary education: 46 percent of the jobs requiring only a high school education required at least an "adept" level of proficiency in at least one skill area. In jobs requiring postsecondary education, 88 percent required that level in at least one skill, and 84 percent required it in more than one skill.

The Applied Learning Initiative. Thirty-eight teachers in more than two dozen schools signed up for the 1991-92 year of the Applied Learning initiative and agreed to create instructional modules aimed at developing the skills identified in the job analysis. The initiative has resulted in what is essentially an applied-learning elementary school.

In essence, applied learning asserts that learning is inherently an active rather than a passive activity, and that learning has relevance well beyond the school walls. Applied learning requires new roles for everyone in the school: students, teachers, and administrators. Students take a far more

active role in their own learning, frequently working in groups and solving problems--as people typically do in the workplace. Teachers are no longer the principal source of knowledge, but rather, they are "managers" or "coaches" who create environments in which students discover knowledge on their own. Administrators are charged with creating and maintaining a vital learning environment--in their case, for the school rather than for the classroom.

Since teachers are in the early stages of designing new practices and modules and observing how well they work, the concept of applied learning is still developing. One teacher has reorganized her elective humanities course for juniors and seniors so that they develop, design, and carry out projects in architecture, art, and music that they then present to another class. One class became so deadlocked in selecting a project that they called in a professional labor negotiator, who helped them reach a consensus.

Fifth graders at one school are actively working as teams in organizing a district-wide Young Authors Conference for students in kindergarten through fifth grade. The project involves writing letters to students and teachers throughout the system and producing a collection of essays by each student. The children on one team have designed ads, a logo, and other materials to publicize the conference. Another group handles all correspondence with local businesses providing products or services for the conference. Engaging in such enterprises enhances students' motivation and self-esteem, as well as their abilities "to do the kinds of things people do at work," as one student put it.

Renewal of Vocational Education. In early 1991, over 300 individuals from the public and private sectors conducted an evaluation of vocational and occupational courses to determine the match between course content and the competencies needed in the workplace, now and in the future. A school-based advisory committee assisted by central office staff and members of the business community reviewed this information and developed a plan for program direction, including establishment of student performance standards.

To meet the challenges of preparing students for the changing workplace, teachers and administrators are participating in ongoing professional development activities to enable them to design courses that integrate vocational and academic education, to select instructional materials and equipment, and to assist students in making a successful transition from school to work.

Significant curriculum changes are being made in the industrial arts field, now coming to be known around the country as technology education or technological literacy. For instance, the new Principles of Applied Technology course will use technology to teach mathematical and scientific

principles (in electronics, hydraulics, mechanics, etc.), and thus prepare students for further learning in community colleges. Such curriculum changes reflect the fact that technology is now a pervasive force in students' lives and that understanding the rules that govern technology is essential to becoming an educated person.

The new approach to vocational training also can be seen in the redesigned laboratories that are replacing what traditionally has been known as "shop." As one high school teacher explained, "In the past we were materials-oriented. We would give students some metal or wood and tell them to make something, like a birdhouse. Now we have become process-oriented. We give them problems to solve." One task, for instance, was for students to design a child's toy with only three specified constraints: the toy had to be something that could be pulled, have no more than three moving parts, and use non-toxic materials.

The Fort Worth school system has invested heavily in state-of-the-art equipment. Sophisticated "TechLab 2000" units, which allow students to use computers to manage experiments with robotics, computer-aided manufacturing, and other high-tech processes, are being installed in nine middle and senior high schools, and nine more will be in place during the 1992-93 school year. Several pedagogical aspects of the new laboratories are worth emphasizing. Assignments begin with definition of a problem, usually one that is fairly open-ended and invariably one that requires students to devise a learning strategy for themselves. Many of the assignments require working as a team, and in all cases computers are used as tools, not as mechanized teacher-talk.

Equity 2000. Fort Worth schools are actively involved in this major national effort sponsored by the College Board to substantially increase the number of economically disadvantaged and minority students who attend and succeed in college. This objective is being accomplished by improving academic preparation and raising student expectations and motivation. Undergirding Equity 2000 is the research finding that algebra and geometry are "gatekeeper" courses without which students are unable to take advanced classes in other subjects or gain admission into college.

Enrollments in algebra and geometry are expected to be sustained and increased by educating guidance counselors on the importance of students taking these basic courses. Moreover, since students who take alternative math courses are essentially getting pre-empted from college admission and many better-paying jobs, the district is committed to eliminating these courses by 1993. To enable students to succeed in the more rigorous curriculum, middle school teachers are redesigning mathematics courses to better prepare students for algebra and geometry.

Equity 2000 has resulted in 75 percent more Hispanic boys and 43 percent more Hispanic girls enrolling in algebra courses in Fort Worth schools.

Among African-American students, 33 percent more boys and 41 percent more girls enrolled in these courses.

Transformation of Student Assessment. New goals for students necessitate new ways of assessing student progress and achievement. Accordingly, the Fort Worth school system is involved with two related projects aimed at finding more appropriate ways of assessing student competency. First, the **Portfolio Project** has the goal of developing a student competency portfolio, which might include samples of the student's work, work history, record of community service, extracurricular experience, and personal resume. Teachers from across grade levels and learning disciplines are studying portfolio-development efforts nationwide.

Additionally, the **New Standards Project,** a national effort managed by the National Center on Education and the Economy in collaboration with the Learning Research and Development Center at the University of Pittsburgh, plans to articulate world-class standards and then develop a national assessment system based on these standards. The assessment system is likely to include timed performance examinations, student projects, and portfolios of student work. Because of the ongoing work of the Portfolio Project, the Fort Worth system is one of six school districts chosen to work with the New Standards Project on developing the portfolio aspect of the new system.

The High Performance Schools Initiative. This project, a joint venture of J.C. Penney, the National Alliance of Business, and Fort Worth schools, aims at introducing systemic changes by focusing on new ways of managing schools. It provides the incentives and assistance for schools to initiate restructuring through school-based management to improve teaching and learning. Among the activities serving as catalysts for education and change at the school level are (1) district-wide skills development and training for principals, central office administrators, and school-based management teams to reinforce the concepts of school-based management and increase understanding of how individual roles and responsibilities will change; (2) the School Incentive Grant Program, which supports the efforts of 10 schools to try new and different strategies for implementing school-based management and related restructuring components; and (3) from local and national experience with school-based management and other aspects of restructuring, development of a district-wide implementation strategy for effective practices and an action guide on lessons learned.

The High Performance Schools initiative and Project C^3's other ventures are not implemented in a top-down way but involve people at all levels--central office administrators, principals, teachers, and students--in the process of determining what changes are needed. Attitudes toward Project C^3 appear to be positive, and changes are going forward across a wide spectrum.

CONTACT: Dr. C. Gary Standridge, Director, Research and Development, Fort Worth Independent School District, 3210 West Lancaster, Fort Worth, TX 76107, (817) 878-3807.

IndianaPLUS: The School-to-Work Connection (Evansville, Fort Wayne, Indianapolis, South Bend, and Terre Haute)

In IndianaPLUS, a pilot project conducted during the summer and fall of 1991, high school students explored the world of work in five Indiana Communities--South Bend, Evansville, Fort Wayne, Indianapolis, and Terre Haute. The students then reported their findings to other students and to the communities at large through participating ABC-TV affiliates.

National sponsors included Project Learning U.S. (PLUS), a joint public-service commitment of ABC television and the Public Broadcasting Service; the U.S. Department of Labor and its Secretary's Commission on Achieving Necessary Skills (SCANS); and ReadAmerica, Inc., a nonprofit literacy organization based in Shepherdstown, W. Va. Working with the State Department of Education, these sponsors helped to organize and facilitate the work of key participants: a social science teacher and his or her team of students from each of the five participating high schools, as well as representatives from the ABC affiliates.

Local advisory committees were formed from representatives of the business community, the school district, and the media. Local Junior Achievement offices and, in some instances, the Chamber of Commerce, also provided support. SCANS staff and research consultants worked with the Indiana teachers and other institutional partners to modify the SCANS interview method so that it would be appropriate for high school students to use to interview workers in a variety of workplace settings.

Following an orientation phase, teams of students at the five project sites interviewed or videotaped workers to identify needed skills. Then they produced written material or videotapes to communicate their findings to middle school students. The participating ABC affiliates reported the progress of the pilot program via news clips. In mid-December 1991, they began public service announcements, local public-affairs programs, and news programs highlighting the IndianaPLUS program. In January 1992, the five stations aired an hour-long Statewide public-affairs simulcast and shared the experiences of the student teams.

IndianaPLUS is an ongoing project, and its tested model is being applied in other locations. See article on pp. 75-85 for a summary of lessons learned and a list of useful resources.

CONTACT: Lori Bryant Woolridge, Capital Cities/ABC, 77 West 66th St., 18th Floor, New York, NY 10023, (212) 456-6356.

Northwest Regional Educational Laboratory (Portland, Oregon)

The Northwest Regional Educational Laboratory (NWREL) has been involved with two exemplary projects that involve both skills identification and assessment and instructional development. One project is a study of entry-level workers conducted jointly by NWREL and the Northwest Policy Center. The other project is Northwest Workplace Basics, through which the States of Washington and Oregon are identifying and developing the skills competencies that their workers need in order to succeed in high-performance workplaces.

Study of Entry-level Workers. This study consisted of two phases--one interviewing employers about entry-level jobs and the other surveying workers in such jobs. An entry-level worker was defined as a worker whose job requires no more than a high school education.

In the employer phase of the study, interviews were conducted with the human resources directors at 58 companies in Alaska, Guam, Hawaii, Idaho, Oregon, and Washington. The companies varied widely in size and represented employers from a great number of industrial sectors, including construction, manufacturing, retail trade, health and human services, government, financial services, and public utilities. When asked about entry-level workers, the directors' major concerns were: (1) the shrinking number of qualified applicants for entry-level positions, and (2) deficiencies in what are now called the SCANS skills foundation and competencies.

In the worker phase of the study, 1,857 entry-level workers (including cashiers, general office workers, and salespersons) from about 468 companies in Hawaii, Idaho, Oregon, and Washington responded to a survey of workforce issues. Among the findings:

- When asked where they learned the skills needed in their job, 89 percent of the workers said it was on the job, whereas only 38 percent indicated they learned the skills in high school.

- Most of the workers said they would like more training in problem solving, teamwork, communications, and computer skills.

- Of seven skills and work attitudes rated as very important by more than 75 percent of the workers, five have also been identified as crucial to successful job performance by SCANS. These are (with related SCANS category in parentheses): regular attendance (personal qualities foundation), completing tasks on time (personal qualities foundation), communicating with others (basic skills foundation), working as a team member (interpersonal skills competency), handling a variety of work tasks (resources competency).

The study shows that both employers and workers regard interpersonal skills as particularly important to workplace success. This means that cooperative learning, which includes development of teamwork and of the capacity for teaching others new skills (another competency identified by SCANS), is a critical need in our schools--especially in light of the finding that workers' major source of workplace knowledge is co-workers.

Northwest Workplace Basics. This project was launched initially by Oregon in late 1990 and was joined by Washington in early 1991. It is a collaborative effort among State agencies in the fields of adult basic education, job training, welfare, economic development, and vocational education; the regional office of the U.S. Department of Labor; and labor, industry, community and technical colleges, job-training programs, and community-based organizations.

In addition to identifying and verifying the competencies with more than 400 employers and workforce trainers, NWREL is identifying curriculum and instructional resources for addressing each skills competency. In addition, NWREL, in conjunction with the Comprehensive Adult Student Assessment System, has developed authentic assessment tools for these competencies that will be field-tested in Washington and Oregon. Practitioners in community colleges are a major focus of this effort, since they use a variety of creative learning tools in their work with adults.

CONTACT for Study of Entry-level Workers: Thomas R. Owens, Northwest Regional Educational Laboratory, 101 S.W. Main Street, Suite 500, Portland, OR 97204, (503) 275-9596.

CONTACTS for Northwest Workplace Basics: Larry McClure, Project Director, NWREL (see above); Holly Miles, Project Coordinator, Miles & Associates, 1045 Teviot Pl., N.W., Salem, OR 97304, (503) 370-7303.

The Public School System (Pittsburgh, Pennsylvania)

The Pittsburgh Public Schools have eliminated the general education track from their high schools, replacing it with an academic track and a technology track. Reflecting the same change in philosophy, what was once its division of vocational education has become the Division of Applied Technology and Career Development. This division, in conjunction with occupational advisory committees representing more than 700 companies, has identified a set of career/life skills competencies.

Following are 14 of them that correspond directly with a SCANS competency or foundation skill (in parentheses): setting priorities, time management (resources competency); teamwork, leadership, stress and conflict management, sensitivity to cultural diversity (interpersonal skills

competency); listening, speaking, reading, writing, quantitative skills (basic skills foundation); problem solving (thinking skills foundation); self-direction, ethical behavior (personal qualities foundation).

A pre-employment mini-course and expanded course are offered by the Pittsburgh Public Schools to prepare students for more advanced forms of career-development training, such as volunteer or actual work experiences and individual projects. The expanded course, a one-semester course, targets all 26 of the career/life skills. The six-week mini-course teaches 10 of the career/life skills, including teamwork and group interaction, communications, ethical behavior, and setting priorities. Instruction making use of student-centered activities is delivered in small groups of 15-20 students. Assessment is student-based and product-oriented: students suggest assessment activities and present products to be placed into their individual portfolios at the end of the course.

It is clear that, like the SCANS competencies and skills, the Pittsburgh competencies/skills are intended for all students rather than those assigned to specific tracks labeled "vocational education" or "general education." Even students who do not elect the mini-course or expanded course get some exposure to these skills. Prominently displayed in about a thousand classrooms in 10 high schools is a chart with the heading "WHAT DO EMPLOYERS EXPECT OF ME AS AN EMPLOYEE?". The chart incorporates a dozen of the career/life skills that employers expect. Some examples are:

- "Recognize problems and find solutions";
- "Communicate well and get along with people";
- "Be honest and dependable"; and
- "Read, write, and calculate well."

The last skill is printed in red, whereas the rest are in black. The chart is quite literally "backed up" by 30 major companies that operate in the Pittsburgh area (including Alcoa, Heinz, IBM, Rockwell, Westinghouse, and USX), whose names, printed in light blue, form the background of the chart. These companies reviewed and approved the competencies/skills listed.

Fred Monaco, director of the Pittsburgh school system's new applied-technology division, says one evidence of its effectiveness is that although the system serves a disproportionate number of at-risk and minority students, its drop-out rate is down to 27 percent, compared to the national average for urban school systems of 45-50 percent.

CONTACT: Fred A. Monaco, Director, Division of Applied Technology and Career Development, Pittsburgh Public Schools, 635 Ridge Avenue, Pittsburgh, PA 15212, (412) 323-3160.

Project of the States
(Connecticut, Kansas, Michigan, Nebraska, Oregon, and Washington)

The Project of the States began in 1986 as a joint project of the Center for Remediation Design (CRD), Washington, D.C., and the Center for Human Resources of Brandeis University, Waltham, Mass. The goal of the project was to restructure the way education and work-related training services are delivered to youth and adults in "second chance systems" like the Job Training Partnership Act (JTPA) and the Job Opportunity and Basic Skills program (JOBS).

The first four years of the project focused on developing better assessment instruments. A critical first step was to identify the skills local employers demanded of their employees and the skills that would be needed over the next decade. CRD developed an employer-survey process that included both written survey instruments and focus groups, and that involved surveying a representative sample of employers in various localities. The results, analyzed by CRD, pointed to the importance of such critical skills as reading comprehension, math computation, oral communications, following instructions, and using documents and forms. Pre-employment skills and work maturity were also identified as being important.

Tools to assess particular skills criteria were then developed. Work groups made up of local managers from many human resources agencies within each State established curriculum objectives that were relevant to local labor markets.

CRD is currently analyzing the specific skills identified by each state in order to determine how they relate to the SCANS competencies. A matrix will be developed which organizes the Project of the States skills within each of the five SCANS competency areas.

The Project of the States has had the following outcomes:

- Six states developed instruments to assess particular basic-skills criteria that relate to the workplace.

- In three states, assessment instruments are now being used by groupings of human resources agencies. Clients enter JTPA, adult basic education, or the JOBS program and take one test that is used for several purposes--reporting information on skills, developing service plans, and planning instruction. This results in better interagency cooperation.

- More than 700 classroom teachers and additional program staff have been certified to use the assessment tools and new curricula. CRD has trained over 20 individuals as trainers to ensure continued implementation of the Project's approach.

- In conjunction with a major publisher of instructional materials for adults, CRD is developing a curriculum that will match the competencies. Activities and strategies will be work-based. The curriculum package will be available in 1993.

CONTACT: Lori Strumpf, Center for Remediation Design, 1133-15th St., N.W., Washington, DC 20005, (202) 872-0776.

THE VITAL LINK
(Fort Worth, Tex.; Orange County, Calif.; and State of New Jersey)

In September 1990, the American Business Conference, an organization of 100 chief executives from the fastest-growing mid-sized companies in America, formally launched THE VITAL LINK to address the needs of primarily noncollege-bound students in making the transition between school and the workplace. The program is based on the principle that individual students can be motivated to learn in school if they understand the relationship between school achievement and success in the workplace. It attempts to motivate students by identifying employment criteria and rewarding individual achievement.

THE VITAL LINK brings together businesspeople, educators, students, and other community leaders to collectively define a local plan of action. That plan should include development of entry-level standards necessary for entering the workplace; continued interaction between business and the education community within an established and specific structure; a system of testing and assessment of progress, with student portfolios as the suggested means of student evaluation; accountability on the part of everyone involved; and a structure for reward.

There are VITAL LINK projects in Fort Worth, Tex.; Orange County, Calif.; and the State of New Jersey, enabling the program to model business-education partnerships at the city, county, and State levels. Following is a description of the activities and outcomes of these projects:

Fort Worth, Tex. VITAL LINK is an integral part of the C^3 education initiative (see pp. 62-67) of the Fort Worth Independent School District (FWISD). Special VITAL LINK activities have included internships for both students and teachers. In the summer of 1991, for example, 40 middle school students and 20 middle school teachers were paired in one-on-one mentorships with Fort Worth health-care professionals in order to tighten the link between classrooms and workplaces. The program received such a

positive response that FWISD budgeted $70,000 to promote teacher internships and to provide increased transportation for those involved in VITAL LINK activities. In addition, the Fort Worth Chamber of Commerce matched that sum, dollar for dollar.

During the summer of 1992, at least 30 additional corporations expressed an interest in participating in the internship program. More than 1,000 students and teachers were successfully placed.

Interest has been so intense in C^3 and VITAL LINK activities that in fall 1992, FWISD and the Chamber of Commerce co-hosted a national conference on these activities. The conference featured discussion of replication possibilities and answered specific implementation questions.

Orange County, Calif. THE VITAL LINK here is a county-wide project to prepare students for the workplace, and is being implemented in the unified school districts of Anaheim, Fullerton, Huntington Beach, Irvine, Laguna Beach, Los Alamitos, and Santa Ana, in partnership with the University of California at Irvine, area colleges, and major employers in the County. Key project elements are:

- Report of Entry-level Skills Requirements. This was developed by business-community representatives and provides educators and students with specific information about required job skills and their application to entry-level employment positions.

- VITAL LINK Personnel Record. This is a one-to-two page transcript that conveys to prospective employers a student's record of activity, academic achievement, and aptitude in each of a set of job-skill areas. The objective is to create a systematic link between employers and high schools by providing employers with direct access to information relevant to the hiring process.

- Business Resource Survey. This is a special questionnaire distributed within the Orange County business community to obtain information on the availability of corporate resources. The information forms the database for a business-resource directory that is provided to participating school districts. Resources include jobs, mentorships, specialized curricula, scholarships, on-site visits/tours, on-campus volunteers, and additional student-to-workplace connections that reinforce job skills.

In addition, the project held a fall 1992 forum on THE VITAL LINK for students, teachers, and employers. The focus was on creative curriculum development for teachers, student-employer interaction, and applications of job skills in work-school settings. The project now plans to hold a similar forum each semester.

State of New Jersey. VITAL LINK activites are being implemented both on a Statewide level and through a business-education partnership in Somerset and Hunterdon Counties.

At the **Statewide** level, large professional associations are being encouraged to participate in VITAL LINK concepts and activities. For example, in fall 1992 the Educational Testing Service, in conjunction with the State Department of Education, launched WORKLINK, a Statewide computer-resume program for students to use when applying for jobs. The program was introduced to business communities by Private Industry Councils (PICs), and will be maintained through PICs and local Chambers of Commerce. Additionally, the State Department of Vocational Education is developing competency standards for specific occupations.

VITAL LINK activities **in Somerset and Hunterdon Counties** are coordinated by the Somerset/Hunterdon Business and Education Partnership. Local businesses, many of which have actively participated in educational outreach, are now coordinating their efforts through VITAL LINK activities. The Partnership is encouraging long-term changes in curriculum and a focus on communications and work-related skills.

CONTACTS:

The **national** contact is Mary Lou McDonald, Manager, Communications, American Business Conference, 1730 K Street N.W., Suite 1200, Washington DC 20006, (202) 822-9300.

For **Fort Worth**, the contacts are Dr. C. Gary Standridge, Director, Research, Evaluation, and Development, Fort Worth Independent School District, 3210 West Lancaster, Fort Worth, TX 76107; and Donna Parker, Vice President-Urban Development, Fort Worth Chamber of Commerce, 777 Taylor Street, Suite 900, Fort Worth, TX 76102-4997, (817) 336-2491.

For **New Jersey**, the contacts are Mary Ann Grumelli-Boychuck, Program Administrator, Educational Initiatives, State Department of Education, 225 West State St., CN 500, Trenton, NJ 08625-0500, (609) 292-9865; and Ms. Dana Egreczky, Executive Director, Somerset/Hunterdon Business and Education Partnership, 64 West End Avenue, P.O. Box 833, Somerville, NJ 08876-0833, (908) 725-6032.

For **Orange County**, the contact is Kathleen T. Jones, Vice Chancellor, University Advancement, University of California-Irvine, Administration 555, Irvine, CA 92717-5600, (714) 856-7915.

STUDENTS USE SCANS TO EXPLORE CHANGING JOBS: Lessons of IndianaPLUS

By John E. Harr

John E. Harr earned his Ph.D. at the University of California, Berkeley, and his M.A. at the University of Chicago in political science/public administration. He is the author of five books and currently serves as Vice President for Corporate Initiatives for Capital Cities/ABC, Inc., sponsor of IndianaPLUS: The School-to-Work Connection. Dr. Harr is ABC Director of Project Literacy U.S. (PLUS), a joint public-service commitment of ABC Television and the Public Broadcasting Service.

IndianaPLUS is a program in which students assess skills requirements in their local workplaces and communicate the results to other students and throughout their communities. It started as a pilot project in the fall semester of the 1991-92 school year, a by-product of the extensive awareness at Capital Cities/ABC, Inc. that the students of today and tomorrow can only meet the increasing skills demands of America's rapidly changing workforce if they know what these demands are before they enter the job market. As a sponsor of Project Literacy U.S. (PLUS), the company had already come to understand the importance of applied learning in producing a literate workforce, and IndianaPLUS became a natural outgrowth of those workplace-literacy efforts.

The appearance of SCANS as a leader in addressing school-work connections was thus a very timely occurrence for IndianaPLUS' creation. SCANS' mission of defining a common core of skills that constitute work readiness, and its job-analysis measures for determining the skills that are required in high-performance workplaces, became IndianaPLUS' foundation.

Project start-up was preceded by months of planning based upon essential design criteria. Among these were that the project bring schools and workplaces closer together; that students be directly involved by interviewing people in their communities' workplaces about the skills various jobs require; and that there be outreach concerning the project's findings to such key audiences as teachers, school administrators, students, parents, and business and community leaders.

Indiana's chief State school officer, Dean Evans, readily agreed to locate the pilot project in his State, and appointed a staff aide, Derek Redelman, as Statewide coordinator. Five cities were selected to participate--Evansville, Fort Wayne, Indianapolis, South Bend, and Terre Haute; the coordinator worked through district superintendents in these cities to select a participating high school in each city.

Also actively involved in IndianaPLUS were SCANS; other parts of the U.S. Department of Labor; the Indiana State Department of Education; PLUS; ReadAmerica, Inc., a nonprofit literacy organization based in Shepherdstown, West Virginia; and the ABC-affiliated television stations in the five cities. Inclusion of the TV stations was particularly essential for project outreach.

Senior-level social-studies courses at the participating high schools (a course at each school) were focal points of the project's classroom phase. With the support of the principal at each school, the school's social studies chairperson designated the course and teacher to become involved in IndianaPLUS, and the project's teachers met in Indianapolis in April 1991 and Washington, D.C. in June for briefings on school-to-work issues and on SCANS concepts and techniques.

Each teacher had to decide how best to constitute his or her fall-semester course as a "team" for the project, and to adapt the course's curriculum based upon briefings and materials received and upon integrating the classroom phase of the project with its workplace-interview and outreach phases.

Given the newness of this type of endeavor, as well as the project's Statewide character, a kick-off gathering was held for all five teams (and their 130 students) in Indianapolis on September 26, 1991. It was a day for building team spirit (such as by distributing IndianaPLUS t-shirts) and conducting workshops on all of the project's phases--classroom, workplace-interview, and outreach.

The workplace-interview phase of IndianaPLUS was based upon use of a modified version of the interview method developed by SCANS to analyze the broad spectrum of jobs in the American workforce. Under the guidance of their social studies teachers, and with the aid of Junior Achievement and other business groups, the five student teams fanned out into their communities interviewing a wide range of workers.

Business advisory councils in each of the cities paved the way for the student-worker interview sessions, but the students themselves had to identify the workplaces to be visited, organize their time, work in teams, and assess results. Not only did this phase draw attention to the importance of school-work links, but it required, by its very nature, closer collaboration between educators and businesspeople.

In the outreach phase, the first task of participating students was to prepare materials (videotapes, handbooks, etc.) on their findings for presentation to the students of middle school classes--a major target audience of the project, since better classroom-work linkages are critical in paving the way for these students to be work-ready when they enter the job market. Team members prepared for this task by surveying representative

samplings of seventh, eighth, and ninth grade students to determine their knowledge of workplace skills and their career interests, and to prepare for the possibility of later measuring the increases in such knowledge that would result from the student-to-student presentations. (See later section, "Use of the Opinion Survey.")

The findings that IndianaPLUS team members presented to middle schoolers included both an overview of changing workplaces and skills requirements and an exploration of the specific job needs of community employers. Acquisition of equipment and technical assistance for presentations by the five student teams was boosted by a $25,000 grant from the Lilly Foundation.

The student-to-student component of the project was beneficial in several key respects. For one thing, team members felt a sense of mission in presenting important issues to younger students, and enjoyed opportunities to be creative in their presentation formats and techniques. In addition, the younger students were more attentive because the presenters were other students (and students who had gone through and beyond the middle school experience).

The culminating outreach event of IndianaPLUS was an in-depth summary of the project that was broadcast Statewide by the five participating ABC-TV affiliates from 7 to 8 p.m. on January 14, 1992. Their participation substantially increased community awareness of school-to-work issues and of the project teams' findings, enhanced the motivation of team members, and provided them with expertise in videotaping and other technical processes.

In large measure, the program attained its major objectives. The five teams averaged more than 40 interviews each in workplaces in their communities. Students increased skills and capacities in a number of critical areas, including computer literacy, communications skills, teamwork, self esteem, and time management. Teachers added much to their knowledge of the world of work, a world from which traditionally they have been cut off because there have not been enough school-work linkages. In addition, follow-up is extensive, including IndianaPLUS classes this school year and ongoing media and public interest.

As with any effective pilot project, IndianaPLUS revealed both practices to be emulated and difficulties to be avoided. Overall, the result is a basic, tested model that others can follow and that is quite adaptable to local circumstances. Here is a summary of the major lessons learned:

Pre-Semester Planning

The first step in the process in to obtain as much information about the program as possible. (See the "Suggested Resources" section at the end of

this article.) If there is serious interest in proceeding after the information is reviewed, the next step is to contact ReadAmerica (see address and phone number under "Suggested Resources") to arrange a meeting between key local participants and one or more consultants. Consultants can be drawn from, among other sources, the staffs of PLUS and ReadAmerica.

For the program to occur in the fall semester (variations are discussed later), key decisions and arrangements have to be made before summer vacation. Budget arrangements and funding have to be assured, as does the school superintendent's basic decision to adopt the program and to appoint a coordinator on either a Statewide, regional, or municipal basis, depending on the program's intended scope. The coordinator's first task is to work with district superintendents to select high schools to participate, then to work with the high school principals and social studies chairpeople to designate teachers to lead the participating classes in the fall.

The main reason for this timing is for the designated teachers (and/or the coordinators or other project administrators) to be scheduled to attend one of the two-day orientation sessions that could be offered by ReadAmerica at various times and in various locales. (Schedules, costs, and other information can be obtained from ReadAmerica.) It also allows time for other preparatory work to begin, such as formation of a community-business advisory committee, adaptation of the curriculum, selection of the type of course to be offered by the teacher, and dissemination of information about the project to eligible students and other people within the school.

The Advisory Committee

The advisory committee is essential as a community base and a focus for business support, particularly in paving the way for workplace interviews by student teams. The committee may also be helpful in providing technical assistance and additional funding.

Where IndianaPLUS experienced delays in advisory committee formation, the crucial communications phase of the project was also delayed. Early formation of the advisory committee facilitates scheduling of the workplace interviews. In most IndianaPLUS cases, committee formation began with a meeting of school, television station, and business representatives.

Selection of a Course

In the very early planning stages of IndianaPLUS, it was recognized that it would be a mistake to attempt to develop a brand new course for this project. In most high schools, there is little room for new courses, and developing one is a long process of working with curriculum committees and local boards for a year or more. There are two possible alternatives: (1) constituting this as a special project for credit beyond regular class

hours and seeking students to volunteer for it; and (2) adapting an existing course. Some appropriate candidates are an Applied Economics course, a regular senior Economics elective, or a Sociology elective.

In Indiana, the first alternative was attempted in South Bend, while the second was chosen in the other four schools. In the former case, it took a heroic performance by the teacher and students to overcome obstacles. Those involved with the project much preferred the second alternative and felt that of the existing course options, the Applied Economics course was the easiest to adapt.

The subject matter of IndianaPLUS and its fieldwork component dovetailed very nicely with the objectives of both Applied Economics and the regular Economics courses. In the former, the interviewing and communicating phases of the project substituted for the normal class project of creating a company and a product and selling that product.

Selection of Students

The Indiana experience suggests that the best method is simply to constitute the project class as the group of entering seniors who register for the designated course as an elective, rather than trying to recruit a special group of volunteers.

The latter approach was what the project originally intended to take, and indeed did take in two of the five Indiana cases. The presumed advantages were: (1) a head start in the interview process; (2) a higher proportion of noncollege-bound youth in the group; and (3) students who understand what the project entails and are willing to participate.

The first advantage was undoubtedly present in Indianapolis and South Bend, but tends to disappear under revisions of the plan discussed in the next section, "Phases of the Curriculum." The second advantage did not apply, since regardless of the method of selection, there was a balance between college-bound and noncollege-bound youth--about 60 percent to 40 percent. The Indiana teachers feel that the most important factor in reaching noncollege-bound youth is making sure that the communications phase of the project is fully carried out, thus calling more attention to the project's findings to middle schoolers.

The third advantage was borne out, although lack of advance knowledge about project requirements did not create a problem in the end. The only caution voiced by the Indiana teachers was that there be enough activity for the small percentage of students who are too shy to engage in some of the fieldwork. These students could work, for example, on the opinion survey, the handbook, or the television taping.

Letting the normal enrollment in the designated class become the project team requires less lead time and is administratively much simpler. Wide dissemination of project availability is still a good idea, however, because it increases awareness among students, teachers, parents, and administrators. Where more than one class/team exists within a particular city, region, or State, the project might benefit from having a morale- and knowledge-building convocation such as the one that kicked off IndianaPLUS.

The Indiana teachers also advised that the ideal time to schedule the project-class meeting is the last regular period of the school day. Such scheduling makes it easier for the students to go to interview sessions, work on communications products, or make presentations.

Phases of the Curriculum

The Indiana teachers emphasized organization of the curriculum into four distinct sequential phases, with specific time periods allotted for each phase and with rather rigorous adherence to these periods so that the critical communications phase is not foreshortened. The four phases are orientation, research, creation, and communications.

Orientation: This should not take more than the first two weeks of the class, in which the students would review the literature, discuss school-to-work issues, answer a preliminary opinion survey about workplace skills (if the survey is used), organize themselves into two-person teams for job-site interviews, and role-play the interview process. While this is going on, the teacher and the advisory committee, with participation by the students, would be scheduling the job-site interviews.

Research: The average number of interviews per participating student should be four (with three the minimum and five the maximum). Students should conduct the interviews as two-person teams, with one student asking the questions and the other taking notes; roles should be alternated. Each student's interviews should be diversified in terms of types and levels of work for the jobs selected. Students should understand that they are not conducting the interviews as career-planning aids for themselves, but as research into skills requirements and how these requirements relate to what is taught in school.

A student participant approaches each interview armed with detailed instructions on how to conduct the interview session; a job-analysis form to complete; and definitions of the job skills the student will be asking a worker about (including a one-page sheet on which the worker rates the importance to her or his job of the SCANS foundation skills and competencies). In each of six major categories of these skills and competencies, the interviewer selects a critical skill and has the interviewee cite a typical task illustrating that skill, trace the steps involved in the task, and describe materials or equipment used in specific steps.

As for the scheduling of the workplace interviews, **the Indiana teachers were unanimous in urging that the interviews be grouped into as short a time period as possible**--preferably a week, with most of them grouped into a two-day period. The students might be given these two days off from regular classes to conduct the interviews, using afternoons of the other days for interview rescheduling. Interviewing would happen in the third week of the class (or fourth at the latest). Effective interview scheduling is critical.

Creative Development: The biggest single problem in the pilot project was that the interview process tended to get strung out, which foreshortened the time available for this phase and the communications phase. The Indiana teachers recommend further modification of the SCANS interview method to reduce interviews from their current 60-90 minute length and to make them less detailed. This change, along with the rigorous scheduling described in the previous paragraph, should eliminate the stringing out of the interview process, leaving the maximum amount of time for the creative development phase (as much as six to eight weeks of the semester).

During this time, the students can discuss and assimilate what they have learned in the research phase and carefully go back for follow-up interviewing or "job shadowing," both of which can be videotaped. (The first round of interviews should not be videotaped.) Above all, the students can use this time for creative decisions about how to communicate what they have learned, and then for production of videotapes, written material, and other communications vehicles; each team should produce one or more products in each category involved.

The creativity of the IndianaPLUS teams was reflected in diverse ways:

-- The Terre Haute team's videotape, a take-off on the television quiz show "Family Feud", combines hilarity with useful information about workplace skills.

-- "The Skills Zone", the videotape produced by the South Bend team, is more straightforward and factual, but has a catchy title inspired by another TV show, "The Twilight Zone."

-- The Indianapolis team's videotaped presentation is in the form of a Gothic drama about what workplaces are like in a large organization.

-- The handbooks created by the teams include everything from survey results to poems, and from accounts of project experiences to crossword puzzles.

Communications: In the final two to four weeks of the semester, team members use the communications products they have developed to present their experiences to the middle schoolers, others in the schools, and people

throughout the community. This is the "pay-off" stage of the project and should not be short-changed; prior deadlines must be set with this in mind.

Empowering and enabling students to be communicators and change agents is the real thrust of the IndianaPLUS project. The ideal outcome is for middle school students to start thinking seriously about their skills needs much sooner than they otherwise would. To the extent that this happens, other important outcomes will also happen--such as revisions in curricula and teaching methods and the development of closer relationships between educators and businesspeople.

In light of the project's thrust, teams must give careful consideration to their communications strategies and tactics. How many teams of presenters can be organized from the overall team? Should presentations be made at a middle school assembly, or in classrooms? Can presenters be organized so as to visit each of three or more classrooms every day for several consecutive days? Should teams work on only a relatively few "feeder schools?" Will there be time for a question-and-answer session? These and similar questions are critically important.

Role of the Television Stations

Whenever a school-to-work project like IndianaPLUS is adopted in any locale, a strong push should be made to involve the local ABC television affiliate and/or the Public Broadcasting Service (PBS) station in the area. While no one can guarantee in advance that a station will participate, it is highly unlikely that both the ABC and PBS stations will decline. The project is a good local story and is directly linked to the schools, the business community, and other important station constituencies.

The role of a participating television station is threefold: (1) to help form and participate in a local community advisory board; (2) to provide technical assistance to the student teams in making their videotapes; and (3) to cover the initiation and progress of the project in the station's news, talk, and public affairs programming. The last task, of course, builds upon the communications phase of the project by making results and experiences available to the entire community even as team members are communicating directly with fellow students.

The major television event in Indiana was the hour-long program on the project broadcast simultaneously by all five ABC affiliates at the end of the semester. This kind of cooperative simulcast, of course, is relevant only when the project is regional or Statewide, and even then is not a necessary event. Whatever the coverage, it should increase in amount as the project progresses, and should culminate--at the very least--in a locally-produced public-affairs program that highlights the students and their findings. If a simulcast develops beyond this, so much the better.

As for how many schools should be involved in any given location, for a Statewide program at least one high school should be involved in each city or area where there is a participating television station. Subject to constraints of time and funding, a station may be able to work with more than one school in its broadcast area. The most important factor in TV involvement is the ripple effect created by the project.

Costs

Expenses fall into two main categories: (1) costs for preparation, principally teacher orientation, and (2) out-of-pocket implementation costs. In the first category, the consultation meetings and orientation sessions discussed in the "Pre-Semester Planning" section above are essential for effective planning. Out-of-pocket costs include relatively minor transportation and other expenses team members incur in the interview process, as well as funds for equipment and for production of videotapes and printed materials.

IndianaPLUS had the advantage of the Lilly grant to pay for camcorders and production costs, but the relatively small amount per school that this involved could have been obtained from the business community in each of the five cities had the process started sooner. Other potential sources of help include the television stations involved and the families of participating students. The Indiana experience suggests that out-of-pocket costs can be held down to $2,500 to $3,000 per school, depending on local ingenuity, with the major portion going for printing.

The total cost of a project will depend upon its scope--whether it is local, regional, or Statewide, and how many schools it includes. For a Statewide project with five to ten schools, the total estimated cost, for both preparation and execution, is between $25,000 and $50,000.

Among options requiring additional funds are: (1) preparing and processing any opinion surveys included, and (2) a special event, such as the Statewide convocation in Indiana. The Indiana teachers suggest that consideration be given to making telephones available to their project classes for setting up workplace interviews and performing other community-outreach activities.

Variations

Two variations of IndianaPLUS seem quite feasible: (1) mounting a project in spring semester instead of fall, and (2) conducting a project as a school-to-work transition effort under the Job Training Partnership Act (JTPA), which provides training and related services to economically disadvantaged youth.

For a spring-semester project, only one major change needs to be made--the class to become the project team should be a second-semester junior

class instead of a second-semester senior class. School administrators and teachers know how hard it is to organize anything out of the ordinary for second-semester seniors, who are focused totally on graduation. A second-semester junior class has advantages for teacher preparation, student recruitment, and other arrangements that can be made in first semester.

If the project operated under JTPA, the basic ingredients would be the same, but might be compressed into a shorter time period and thus place a premium upon early team selection and workplace interviewing. JTPA participants, of course, might be able to devote more hours to the project, and to receive stipends, making the project their own workplace.

Summer might be a good time for such a project. The communications phase could be directed toward other JTPA participants (instead of toward middle school classes), since many of those participants attend high school.

Use of the Opinion Survey

As mentioned earlier, the IndianaPLUS survey was useful in determining the workplace-skills knowledge and career interests of seventh, eighth, and ninth graders in participating schools. However, the survey's second purpose--comparing its responses with project results and post-semester longitudinal data--could not be fulfilled when funding for a follow-up questionnaire did not develop in time. The Indiana teachers feel that the survey should be an option for a teacher, particularly where an activity is needed for students uncomfortable with interviewing and with certain tasks in the communications phase.

How powerful an experience was IndianaPLUS for its participants in terms of their learning about the skills required in the workplaces of today and tomorrow? Consider an item that appeared in the Terre Haute North High School Daily Bulletin on April 9, 1992--three months after the school's fall-semester project class ended:

> IndianaPLUS--Thanks to Natasha Dhar, Joan Schwarz, Livia Hester, Jeff Zwerner, Greg VanVactor, and Geoff Lambert. These students did an outstanding job presenting IndianaPLUS material to 600 seventh and eighth graders at Woodrow Wilson yesterday.

In other words, Terre Haute team members were communicating their findings in a middle school **even after they were no longer participating in the project**. In fact, according to their teacher, North High social sciences chairman Ron Stewart, they had spoken to 25 different middle school classes, and members of two other teams of his were scheduled to appear before 50 additional middle school classes, for a total of 1,800 students briefed on IndianaPLUS results. From such seed planting, trees of learning grow.

Suggested Resources

ReadAmerica, Inc. has general program information, including the revised SCANS interview method, assistance on organizing a project in your community, and details on the teacher-training seminars. (**CONTACT:** Dr. Anderson Clark, ReadAmerica, Inc., P.O. Box 1641, Shepherdstown, WV 25443, (304) 876-0866.)

Project Literacy U.S. (PLUS) is an alternate source of general information, and has program videotapes available--including a half-hour training tape. (**CONTACT:** Lori Bryant Woolridge, Capital Cities/ABC, 77 West 66th St., New York, NY 10023, (212) 456-6356.)

The U.S. Department of Labor is another alternate source of general information, including the revised SCANS interview method. (**CONTACT:** Robert A. Dickmann, Rm. S-5314, Employment and Training Administration, 200 Constitution Ave., N.W., Washington, DC 20210, (202) 219-6145.)

PREPARING LIMITED ENGLISH PROFICIENT STUDENTS FOR THE WORKPLACE

By Allene Guss Grognet

Allene Guss Grognet is vice president of the Center for Applied Linguistics, a Washington, D.C.-based nonprofit research and service institution. Dr. Grognet has worked with business, labor, government, and educational institutions for the past 25 years, designing English-as-a-second-language programs, training teachers, and developing materials and assessment measures for language-minority individuals. She developed the Basic English Skills Test (BEST), an instrument which assesses authentic listening, speaking, reading, and writing skills. Most recently, she has been involved in designing prototype language-learning and language-testing services that are computer-based and multimedia-oriented.

The SCANS report What Work Requires of Schools addresses the question of why students are emerging from our high schools unprepared for the workplace. The report also outlines recommendations to help schools teach students the skills they need to be productive citizens. What is unique about the SCANS findings is that the commissioners were aware of and took seriously the special challenges posed by the large number of limited English proficient (LEP) workers who will be entering the workforce in the 1990s and beyond.

Several recent reports, including the 1990 Census Report, paint a vivid picture of the changing American workforce. If we look at population growth during the 1980-1990 decade, we find an overall 53-percent growth in Hispanic populations and a staggering 107.8-percent growth in Asian and Pacific Islander populations. Newcomers among these populations tend to have limited proficiency in English. Add to this the approximately 375,000 LEP refugees from Eastern Europe, the Middle East, and Africa who have entered the United States in the same decade (as documented in the 1990 Refugee Reports), and the numbers grow and become more diverse.

In addition to the Census figures, Workforce 2000: Work and Workers for the 21st Century (Hudson Institute, Indianapolis, Ind., 1987) points out that "immigrants will represent the largest share of the increase in the population and the workforce since the first World War." There is no question that both the workforce and our schools will be more culturally diverse in their demographic make-up, and that the preparation of future workers must include methods and techniques that address the SCANS skills and competencies in a linguistically and culturally sensitive manner.

What Work Requires of Schools is about high-skills and high-wage environments. It focuses on "workplace know-how," or the skills foundation and competencies that employers seek in workers (see "Workplace Know-How" chart, p. 6.). The report is a huge step forward in connecting schools

and workplaces, and in recognizing that students need to start acquiring these skills and competencies at an early age. Students born in the United States who are native speakers of English already have the "tools"--English language and U.S. culture--with which to learn the foundation skills and master the competencies. Language-minority students usually do not. To illustrate, learning to read and write in English assumes one speaks English and needs only to add literacy, and allocating time resources assumes that everyone has the same cultural concept and value of time.

The SCANS Commission, by not glossing over language and culture as critical factors in acquiring workplace skills, is contributing to a new and healthy trend. The majority of articles, reports, and books on workplace skills that have appeared in the past few years neglect linquistic and cultural aspects at best, and make light of them at worst. The major aspects to be carefully considered are: (1) language minority students, (2) linguistic considerations, (3) cultural considerations, (4) implications for schools, and (5) implications for assessment.

Language Minority Students

What Work Requires of Schools assumes that skills and competencies will be performed in English, and not at a simple proficiency level at that. It also assumes that foundation skills and competencies will be learned in English or, if learned in one's native language, will be easily and quickly transferred to English.

It should be noted that language-minority students are a diverse group--ethnically, linguistically, and culturally. Some are ready to acquire the skills outlined by SCANS, but others need special support or the opportunity for language development before they are ready to compete with native English-speaking peers. Those deserving special attention include:

Students who have had strong academic preparation in their home countries, but need to develop the linguistic skills necessary to express their ideas in English. These students need the opportunity to acquire the interaction skills necessary to negotiate ideas across languages and cultures. As experience in high-tech and other complex work environments has shown, foreign-born professionals with strong technical skills are often limited in their opportunities because they lack the social and linguistic skills deemed necessary for effective communications, team building, and conflict resolution. If these students, many of whom are very talented in scientific and technical fields, are to acquire the SCANS skills related to communications and social interaction, they may need special classes that allow them to explore U.S. cultural concepts while developing their speaking and listening skills.

The author recently designed such training for a group composed mainly of Russian refugees studying in a community college. While the students were

highly trained technically, they could not communicate effectively in English about their subject, and many of those who could were viewed by American co-workers as rude and arrogant.

In another situation, at the U.S. Patent Office, the author was part of a team that designed and taught necessary language skills (e.g., communicating with lawyers on the telephone, handling legal briefs or patent claims) to a linguistically diverse population. These students and their English-speaking supervisors also participated in seminars addressing cultural diversity in the workplace.

Students who have strong oral English skills but weak or nonexistent literacy skills. Many of these students have strong oral interaction skills such as those developed in the streets and on the playground, but lack the academic skills necessary to access information, cope with extended texts, solve abstract problems, and deal with hypothetical situations. They need programs that upgrade their oral English skills and prepare them to benefit from academic, vocational, or job-training classes.

Students who lack both oral English interaction and the literacy skills necessary to access information, express ideas, and solve communications problems in English. Generally, these students are new to the United States and also lack cultural coping skills. They need strong developmental programs that help them acquire the language, literacy, and cultural skills needed to learn and work in the United States.

Linguistic Considerations

"Acquiring English language skills" can mean many things. It may refer to listening, speaking, reading, and writing, or it may refer to the social language necessary for shopping in a supermarket. It may also refer to the academic language necessary to study a school subject.

What Work Requires of Schools covers the areas of listening, speaking (oral communications), reading, and writing. Some mention needs to be made, however, of the differences between social language (e.g., face-to-face conversation on a concrete topic, "small talk") and academic language, since it is crucial to the acquisition of SCANS skills. Linguistic researcher J. Cummins, for example, finds that characteristically, social and interpersonal language is concrete, informal, contextualized, and cognitively undemanding, whereas cognitive amd academic language is abstract, formal, decontextualized, and cognitively demanding.

In addition, researcher V. Collier has shown that it took three to five years for elementary LEP students to acquire social oral English equal to that of their peers, but a minimum of four to seven years for these same students to attain grade norms in oral academic English--and Collier's study was carried out in an affluent suburban school district. The SCANS skills and

competencies fall somewhere between the social and academic poles, but they clearly tend to be closer to the latter than the former.

Researcher S. Heath enumerates some of the ways in which schools expect children to be able to use English before they begin formal schooling. (For the most part, these expectations are implicit, rather than explicit, and cause frustration for both student and teacher when they are not met.) Students are expected to use language to label and describe objects, events, and information; recount past events or information; follow directions from oral sources without needing sustained personal reinforcement; sustain and maintain the social interaction of the group; and obtain and clarify information.

If teachers expect such linguistic behavior in kindergarten, consider the mismatch of expectations that occurs when a student is in junior high school and still cannot perform the above tasks in English, which is the case with most LEP students. For example, think of junior high or high school LEP students grappling with a physics experiment on magnetism. Even if they had strong academic preparation in their home country, they would need to learn and use language to follow directions *(first, second, next, then,* etc.) and to understand content-obligatory terms *attract, repel, magnetic properties, magnetic fields*), prepositions of location *(to, from, near);* and descriptive modifiers (describing, for example, the patterns that iron shavings make on paper when a magnet is used).

Similarly in math, following directions to solve a problem involves not only technical vocabulary, but an understanding that *add, plus, combine, sum, more than,* and *increased by* are all terms of addition. Students also need to be able to understand the syntactic difference between comparatives such as *greater than* and *less than* and prepositional phrases such as *divided into* and *divided by.*

Students without strong academic skills in their native language have an even harder time. Lack of academic English proficiency (and the critical thinking skills that accompany it) is the major reason for failure among language-minority students and has contributed to their high dropout rates. Not even the contextualization and real-world orientation noted by What Work Requires of Schools will help LEP students unless direct attention is given to acquiring the oral language and literacy skills needed to successfully access the SCANS competencies. The English language needs to be the tool, not the barrier, to success.

Cultural Considerations

SCANS acknowledged that a separate consideration for language-minority students in accessing SCANS skills and competencies is culture. These skills and competencies reflect expectations of the American workplace, and therefore necessarily assume a U.S. cultural concept of the world.

That is a statement, not a criticism. Culture, like language, must be taught; cross-cultural situations need to be overtly set up so students can acquire an understanding of different expected cultural behavior. Like acquiring a new language, cultural adaptation does not happen by osmosis. It must be strongly stated that like languages, cultures are different--not deficient. Neither the classroom nor the workplace should expect LEP students to give up their native languages, but should encourage them to become bilingual by adding English. So too, schools should help students become bicultural, able to function competently in two cultures.

If we look at culture as an iceberg, we can see that the **behaviors** we associate with culture are only the tip. Beneath the surface are the implicit and invisible **beliefs, attitudes, and values** that shape those behaviors. Surface culture includes such elements as food, dress, holidays, art, folklore, and physical carriage, whereas deep culture encompasses family ties, ethics, ownership, time, and space.

Anthropologists, linguists, and cross-cultural specialists have analyzed dominant cultural themes and have identified major values, or qualities, that seem to guide the behavior of people and form deep cultures. Consider, for example, characteristics of cultures of doing and characteristics of cultures of being:

Cultures of Doing	**Cultures of Being**
Task-oriented	Person-oriented
Earned status	Ascribed/inherited status
Flexible roles	Fixed roles
Nuclear family	Extended family
Change/movement	Stability/harmony/tradition
Need for achievement	Need for affiliation
Individualism	Belonging to a group
Future orientation	Past/present orientation
Monochronic (one thing at a time)	Polychronic (several things scheduled at once)

The above should be seen in terms of continuums rather than absolutes; cultures are somewhere along a continuum for each of the values noted. Without stereotyping, one can say that U.S. culture is much closer to the "doing" pole than are either Hispanic or Asian cultures. A few examples:

Task Orientation. The first question asked in the United States is often "What do you do?" or "Where do you work?" rather than "Who are you?," "What's your family name?," or "Who are your relatives?".

Achievement. In our highly competitive society we value the success story, the myth of going from rags to riches, Horatio Alger, and the Abe Lincoln

legend. We also talk about being Number One, leading the world, becoming bigger and better, and conquering the environment. Other cultures may have other priorities.

Individualism. Frequently, we expect every person to be independent, responsible, and self-respecting. We question seriously thoughts that the group should take precedence over the individual. The freedom of the individual is well-guarded by law.

Change and Movement. We are future-oriented. We put more emphasis on youth than age, on change than preservation. We see things "getting better tomorrow," talk about "progress," and advertise products as "new and different."

The above vignettes, like cultural attributes, are neither good nor bad. Formulations of this type are not precise and are often highly controversial. But despite their limitations, these generalizations can be useful in providing insights into the culture of a society, and thus the patterned behaviors of its members. Culture can determine the ways people behave, perceive the world, and evaluate the behavior of others. It is because of different cultural values that some Japanese see Americans as "lazy," while an American editorial described the Japanese as "bees." In a cultural values survey conducted by the author, U.S. students viewed many Asians as "very formal" or "shy"; Asian and Latin American students described their U.S. counterparts as "brusque" and "rude"; and U.S. students characterized the Hispanic "abrazo," or hug, as "loud" and "demonstrative." Through different cultural eyes, the SCANS sociability category obviously means different things.

The SCANS skills, like the U.S. workplace, are culture-bound, a fact that should be recognized. This is especially true of thinking skills and personal qualities, but it is also true of the basic skills. Arithmetic functions, for instance, are noted differently in different cultures. In listening skills, different cultures listen for different things. In speaking and writing, some cultures get to the point by a circular rather than a linear route. The notion of a topic sentence, supporting evidence, and a conclusion can be culturally foreign.

Let's look at a few of the SCANS competencies through the cultural eye of a language-minority student. Under **Resources**, time is a category. In the United States, there is a strong sense of time as a resource--something to be used, spent, saved, shared, and so on. We say "time is money," "can you give me a few minutes of your time," "a stitch in time saves nine." But in many cultures, a given time means something like "within a half-hour," not "on-the-dot." Even with the ability to express time in English, the underlying (and unstated) perception of time that a language-minority student holds may be very different from general U.S. perceptions.

Under **Interpersonal Skills,** exercising leadership is very difficult for a student raised in a culture of fixed roles, or a culture in which questioning a policy or procedure of a supervisor (or teacher) means that the supervisor "loses face." When the word "question" has meanings as various as "display initiative" and "be insubordinate," cultures are obviously in conflict.

Under **Information,** how one organizes information is culture-bound. Under **Systems,** social and organizational systems differ from culture to culture--e.g., the difference between social and organizational systems in Japan and the United States. We have a saying that reflects our values and translates into behavior: "The squeaky wheel gets the oil." The Japanese also have a saying: "The nail that stands up gets hammered down."

What seems reasonable and important to a person in one culture may seem irrational and trivial to someone in another culture. This is not to say that language-minority students do not have to acquire another layer of cultural skills. It says that for adults and young adults, those cultural skills must be explicitly taught.

On the other hand, in addressing the issue of cultural diversity in the workplace, SCANS recognized that cultural accommodation is a two-way street. It is also a continuous, nondiscrete process. In practice, the language-minority student or worker is, of necessity, the one who accommodates most. Others must go at least a quarter of the way toward understanding and accepting that which is not only different but is inextricably bound to who we are and to our sense of self-esteem.

Implications for Schools

Schools have typically addressed the needs of language-minority students through three models: bilingual education, English-as-a-second-language (ESL) programs or classes, and mainstreaming without linguistic or cultural support. Little needs to be said about "sink or swim" type of mainstreaming, also known as "submersion," other than to indicate that it has not been found to meet the educational needs of most LEP students. The first two models, however, merit highlighting.

Bilingual Education. The students' home language and English as a second language are used in some combination during the school day. There are several variations, but in all effective bilingual programs, the prescribed curriculum is aligned with the curriculum of the school in general. The student's home, or primary, language is used for subject-matter instruction until her or his command of English allows a phased transition into mainstream programs. Models of bilingual programs include early-exit, late-exit, immersion, and two-way.

In **early-exit** programs, young children receive an average of 30-60 minutes a day of instruction in their primary language, usually for the introduction

of initial reading skills. The primary language is phased out by the second or third grade, and all instruction is in English thereafter.

A major feature of **late-exit** programs is that students receive a minimum of 40 percent of their total instruction in their home language. They remain in the program through the sixth grade regardless of English proficiency.

Instruction is essentially in English in **immersion** programs, but children are encouraged to use their home language to clarify instruction. Transition into mainstream classes is expected after the first or second year.

In **two-way** programs, children who speak English as their native language are in class with language-minority students, and subject matter is taught in both English and the minority language. The intent is for students to learn both subject matter and each other's language over a period of time, usually four to six years. By including both language-majority and language-minority students, such programs end the segregation that has often accompanied bilingual education.

Bilingual education is not seen as an end unto itself, but as an efficient means to impart the whole curriculum to a special category of students. Using their native language helps students to develop cognitively; they acquire age-appropriate reading, writing, and subject-matter skills in their own language before being asked to read, write, compute, remember facts, and think critically entirely in English. Bilingual education models certainly allow for the integration of the SCANS skills and competencies as a component of curriculum and teaching strategies.

There are relatively few bilingual programs around the country that start at the junior high or high school level and use students' native language as a medium of instruction. In recent years, school districts with significant LEP populations have begun to address the needs of older students through "newcomer" high schools, which integrate the learning of language with the learning of academic content, or through bilingual vocational-education programs which teach the skills of a specific vocation in the native language along with ESL.

It is not the purview of this article to argue for any one model of bilingual education, but it should be noted that young students who receive more instruction in their native language have a stronger foundation on which to build skills in the future. Recent research, such as by K. Hakuta and L. Wong-Fillmore, shows that it is very difficult for students to reach their academic potential if courses taught in their native language are cut off too soon. Students do not develop cognitively in either their native language or English. In addition, native language instruction acts as a bridge between the home environment and the school, while early mainstreaming often acts as a wedge, alienating children from parents and lowering self-esteem.

English as a Second Language (ESL). ESL also means different things in different schools on the K-12 level and the adult level. Representative ESL models include traditional classes, content classes, sheltered instruction, and paired or adjunct learning.

In **traditional ESL classes**, students learn English for all or part of the day in an environment that is largely divorced from the academic content of the school. The language learned is mostly social language, often within a grammar-based (rather than functional) curriculum.

Both social and academic English are taught in **content ESL classes**, and they are taught in the context of academic subject matter. A thematic approach is emphasized, with language learning contextualized in authentic situations and thinking/study skills embedded in language-learning tasks. Content ESL incorporates such techniques as cooperative learning, peer tutoring, discovery learning, and hands-on activities.

Sheltered instruction features subject-matter classes where attention is also given to developing competence in English. Many of the techniques described under content ESL are employed in the sheltered-instruction model.

Subject matter and English instruction are directly linked in **paired or adjunct learning**. The content teacher and the ESL teacher work together to develop both subject matter and linguistic competence.

The trend in teaching ESL, on both K-12 and adult levels, is toward content-based models. Practice has not caught up with theory yet; there are still more ESL classes teaching grammar rules than classes teaching how to ask and answer questions, clarify and verify, give and follow directions, describe, report, explain, and so on, in a meaningful academic or work context. However, one can say that the cutting edge of the ESL profession is in tune with the SCANS findings, and that models that truly integrate ESL and content instruction closely reflect SCANS suggestions--for example, the models of P. Richard-Amato and M. A. Snow, J. Crandall, and M. Belfiore and B. Burnaby.

Recommendations for Schools

Following are some simple and yet challenging recommendations for schools--recommendations that emerge from the linguistic and cross-cultural needs of language-minority students and that must be met if these students are to acquire the SCANS skills and to function competently in the American workplace.

-- The acquisition of oral and written English must be explicitly addressed if language-minority students are to attain the necessary skills outlined by SCANS. Programs which foster the acquisition of

social, academic, and vocational language proficiency need to be planned and developed.

-- Similarly, the issue of culture must be addressed for language-minority students. For younger students this means setting up learning situations in which they **acquire** expected behavior. For older students, this means **explicitly teaching** U.S. culture by comparing and contrasting values, attitudes, and behaviors. Cross-cultural programs must value the home culture of the student, adding an understanding of U.S. culture and not trying to eradicate what is already there. This gives students opportunities to build self-esteem. In addition, all schools must set a climate in which bilingualism and biculturalism are seen as resources rather than problems.

-- Schools must develop language-learning curricula that integrate the linguistic skills of listening, speaking, reading, and writing within a context that relates academic skills to authentic workplace tasks.

-- Appropriate instructional objectives must be established. These include language, contextualized academic content, thinking or study skills, and cross-cultural skills.

-- Schema, or background knowledge (including cultural knowledge), must be consciously developed in English. This is typically accomplished through oral language activities that precede any presentation of information or extensive reading and writing activities.

-- A wide range of materials needs to be used in the classroom. Students should be able to interact with and produce a variety of texts, including maps, charts, graphs, tables, lists, timelines, diagrams, and reports. Authentic materials from academic content areas can be used, although it is often necessary to adapt information to make it maximally accessible to students with less-developed language proficiency. This does not mean that the material is simply watered down or made less conceptually rich. It does, however, require that the information be restructured so that relationships among ideas are clear and new vocabulary is sufficiently contextualized. Ironically, the restructuring of large amounts of connected discourse often results in the presentation of that information in other kinds of ways (such as tables or flow charts) that are particularly amenable to assimilation on the part of LEP students.

-- A variety of media should be used to reduce an over-reliance on language as the sole means of conveying information or demonstrating meaning. Demonstrations, a wide range of audio-visual aids, and authentic materials and objects not only

contextualize the language but often leave the student with visual cues for content recall.

-- Experience, discovery, and hands-on learning that encourage students to develop concepts and promote social interaction should be encouraged. These activities place language learning into relevant, meaningful contexts. Games, roleplays, experiments, and problem-solving situations are especially appropriate for acquiring both language and culture.

-- Where possible, bilingual programs for older students should be instituted. Many older students see themselves as somewhat limited in their ability to get good jobs. To successfully acquire the higher-level skills outlined by SCANS, language-minority students need programs that value their language and culture and provide additional opportunities to build self-esteem.

-- The situation of minority students deserves special attention. Many face dual cultural barriers to achievement: the home culture may emphasize fixed roles, therefore de-emphasizing preparation for a career, and schools may not encourage language-minority women to pursue academic or scientific interests, thus dooming them to marginal jobs.

-- Schools must address the extra disadvantage language-minority students face in relationship to technology. If they are to have equal access to technology, a key factor for future job competition, resources must be allocated so that schools in ethnic neighborhoods can install computers, train faculty, and develop curricula providing the kind of experience with technology that students in many middle-class families take for granted.

-- In-service teacher training will undoubtedly be needed to implement the SCANS competencies. This teacher training must include language- and culture-sensitive strategies for content teachers.

Implications for Assessment

While one can point to trends in curriculum development and classroom techniques, there is less clarity in assessment. It is difficult to find valid assessments for measuring proficiency in oral English, literacy, and cultural knowledge. Standardized tests for literacy and/or academic content, as they are now constituted, are inappropriate for students who are acquiring English. Such tests fail to provide an accurate measure of student knowledge and skills because they often require language, cultural knowledge, and test-taking skills that students may not have mastered.

There are, however, a few suggestions that may be helpful:

From the beginning of the process of developing assessment tools, keep in mind linguistic and cultural equity. Such tools will come out at a different point than when linguistic and cultural issues are considered after the fact. A sensitivity to linguistic and cultural pitfalls must be an up-front pursuit rather than an editing job. That translates, for instance, into questions written in English that use subject-verb-object word order as much as possible, that avoid the use of relative clauses (who, which, whom), that use pronouns judiciously, and that minimize the use of negatives ("...is *not* an example of...").

Culturally, sensitivity means being aware of cross-cultural differences and examining every test question for its cultural load. Assessment developers need to continually ask themselves if they assume that cultural conventions are shared by all cultures. In a given test item, for instance, do they rely on a cultural assumption in testing an altogether different skill or knowledge? A quantitative test item that uses a price label on a piece of pre-packaged meat may prove difficult for a language minority student--not because of the computation difficulty, but because the underlying concept of pre-packaged meat is culturally foreign.

In short, test developers need to constantly ask themselves what they are assessing: skills, new knowledge, background knowledge, language, or culture. Test items need to be viewed through linguistic and cultural lenses. Are the instructions and the language of the test items more difficult than the task itself? Are cultural presuppositions embedded in the items?

Alternative assessments, requiring integrated language use, should be used whenever possible. Such assessments include observation of students performing authentic classroom or workplace tasks, checklists or direct descriptions of performance over time, student self-ratings, writing samples, learning journals, and oral and written tests which provide contextual clues to meaning.

Oral testing should be considered as an alternative form of assessment for language-minority students. Literacy in English, when it is not integral to what is being tested, should not become a barrier to being assessed. Tests often fail to distinguish between situations in which the learner is unfamiliar with the language or concepts of the test items, and literacy problems in which the learner lacks the requisite reading and writing skills, but could easily respond to similar items presented as part of a conversation.

Testing in the native language, where applicable, can be a workable alternative. This is especially the case if students are familiar with certain concepts and terms in their own language. However, such tests need to be valid and reliable in their own right.

Demonstrations and oral tests that allow for clarification and negotiation of meaning can help to equalize the language barrier.

Portfolio assessments, which focus information from a variety of assessment sources over a period of time, are probably the most valid measure of progress for LEP students. Using information from diverse sources rather than relying on a single measure can also help interpret the results of standardized tests in light of these other information sources.

Assessment situations should not be isolated from the sociocultural context of the learner. For instance, in standardized tests, students are assessed individually and no help may be given or received. Many language-minority students are used to working together, particularly to help one another solve problems that require English reading and writing. By equating access to resources, peer assistance, and group work with "cheating," the assessment tool can overlook the strengths and coping strategies that language-minority students may bring to the classroom or the workplace.

Relatively few classrooms use alternative techniques extensively. Teachers who feel that students must get past "the test," whether that test is the Student Achievement Test (SAT) or the Test of Adult Basic Education (TABE), often teach with it in mind, perpetuating curricula and instruments that are not valid for LEP students. However, researchers in the field of assessment for language-minority students (including E. Hamayan and J. Damico, J. M. O'Malley and L. Pierce, and M. Saville-Troike) are beginning to publish on this topic, and SCANS can be a source of support for alternative measures.

Conclusion

The SCANS report What Work Requires of Schools provides a great service to language-minority students in that it does not presuppose proficiency in oral English and U.S. culture, and its recommended assessment procedures are free from linguistic and cultural bias. By explicitly addressing the needs of limited English proficient/language-minority students vis-a-vis the areas of English language and culture, SCANS is helping to promote the concept of equal access to educational opportunities for all American students.

References

Belfiore, M.E. and B. Burnaby, Teaching English in the Workplace. Toronto: OISE Press, 1984.

Carnevale, A., L. Gainer, and A. Meltzer, Workplace Basics: The Skills Employers Want. San Francisco: Jossey-Bass, 1990.

Collier, V., "Age and Rate of Acquisition of Second Language for Academic Purposes," TESOL Quarterly, Vol. 21 (1987).

Crandall, J., ESL Through Content Area Instruction. Englewood Cliffs, N.J.: Prentice-Hall, 1987.

Cummins, J., "Cognitive/Academic Language Proficiency, Linguistic Interdependence, the Optimum Age Question and Some Other Matters," Working Papers in Bilingualism, Vol. 19 (1987).

Cummins, J., Bilingualism and Special Education: Issues in Assessment and Pedagogy. San Diego: College Hill Press, 1984.

Hakuta, K., Mirror of Language: The Debate on Bilingualism. New York: Basic Books, 1986.

Hamayan, E. and J. Damico, Limiting Bias in the Assessment of Bilingual Students. Austin, Tex.: Pro-Ed, 1991.

Heath, S., "Sociocultural Contexts of Language Development," in Beyond Language: Social and Cultural Factors in Schooling Language-Minority Children. Los Angeles: EDAC, 1986.

Johnston, W. and A. Packer, Workforce 2000: Work and Workers for the 21st Century. Indianapolis: Hudson Institute, 1987.

Mikulecky L., "Job Literacy: The Relationship Between School Preparation and Workplace Actuality, Reading Research Quarterly, Vol. 17 (1982).

O'Malley, J. M. and L. Pierce, "Portfolio Assessment," Forum, Vol. XV, No. 1 (1991).

Philippi, J., Literacy at Work. New York: Simon & Schuster, 1991.

Refugee Reports, Volume *XI,* No. 12 (December 1990).

Richard-Amato, P. and M. A. Snow, The Multicultural Classroom. New York: Longman, 1992.

Saville-Troike, M., "Teaching and Testing for Academic Achievement: The Role of Language Development," Focus, Vol. 4 (1991). Washington D.C.: National Clearinghouse for Bilingual Education.

Soifer, R., et al., The Complete Theory to Practice Handbook of Adult Literacy: Curriculum Design and Teaching Approaches. New York: Teachers College Press, 1990.

Stitch, T., Reading for Working: A Functional Literacy Anthology. Alexandria, Va.: Human Resources and Research Organization, 1975.

Wong-Fillmore, L., "The No-Cost Study," paper presented at the annual meeting of the National Association for Bilingual Education, Washington, D.C., 1991.

TECHNOLOGY AND HIGH-PERFORMANCE SCHOOLS: A SCANS Survey

By Michael Schmidt and Arnold Packer

Michael Schmidt, a Presidential Management Intern with the Office of Personnel Management's Human Resources Development Group, served as a staff member for SCANS and has written several articles on workforce policy and human resources development. **Arnold Packer**, a Senior Fellow at the Johns Hopkins University Institute for Policy Studies and chairman of its SCANS/2000 Program, served as Executive Director of SCANS and co-authored the seminal study Workforce 2000: Work and Workers for the 21st Century.

Technology should play an important part in any school, but it plays an especially vital part in the high-performance school. In early 1992, SCANS surveyed a number of high school and middle school technology directors, as well as some of this country's leading technology vendors, and asked them to identify the kinds of technology that are currently available to schools, given specified budgetary limits.

For the sake of this exercise, we asked these experts to assume an average-sized high school of 1,400 students, allocating $1,000 per student for hardware (a one-time cost), $200 per student for software (a continuing cost), and $300 per student for staff development (also a continuing cost). They responded by not only identifying the types of technology available but also by suggesting ways in which that technology can be used effectively.

The hardware and software suggestions that the technology directors and vendors gave us could be combined in many different ways, depending upon the specific needs of an individual school or school district. Just as there is no one right way to develop a high-performance school, so, too, there is no one "technology package" for the high-performance school.

However, to help readers begin to think about the resources needed to purchase technology for a high-performance school and about the potential of such a system, we have prepared a sample budget plan (Exhibit 1) with hardware and software that could realistically be purchased, at 1992 costs, within our funding assumptions. Setting up and implementing such a package is a complicated, trial-and-error process, of course, but we submit a simply-described four-step process that we believe will be helpful in adapting our plan for individual school use.

EXHIBIT 4
Sample Year-One Income/Budget for Technology Plan

INCOME	1,400 Students		
	Hardware $1,000 per student*		$1,400,000
	Software $200 per student**		$ 280,000
	Teacher training $300 per student**		$ 420,000
		TOTAL	**$2,100,000**
BUDGET			
Hardware*	2	ILS Labs (30 stations each)	$ 140,000
	70	Classroom teacher workstations	$ 175,000
	80	Laptop computers for teachers	$ 160,000
	380	Computers for students (classrooms, resource center)	$ 495,000
	100	Laserprinters	$ 100,000
	10	Computer servers	$ 70,000
	100	CD/ROM players for classrooms and for resource center	$ 150,000
	Facilities for preparation/security		$ 110,000
		TOTAL	**$1,400,000**
Software and Support**	ILS Lab software		$ 70,000
	Maintenance/repair/replacement fund		$ 80,000
	Classroom software (instructional, applications, and interactive)		$ 90,000
	Support staff person		$ 40,000
		TOTAL	**$ 280,000**
Teacher Training	Computer training for 15 days (56 teachers at $30 per hour)		$ 201,600
	Non-Computer training		$ 218,400
		TOTAL	**$ 420,000**
	TOTAL EXPENDITURES		**$2,100,000**

* One-time costs
** Continuing costs

STEP 1: Preparing for Technology Acquisition

Establish a Planning Committee

Our survey respondents advised schools to create a Technology Planning Committee to define purposes and oversee implementation before spending any money. This committee often decides what sorts of technology would best suit the school's educational needs, and what staff development strategy to pursue.

Agree on Purposes of Educational Technology

The technology that a school system chooses should be determined by what it hopes to achieve. A school system should come to an agreement on why it wants to use technology in its schools, and clearly present the reasons.

Cincinnati public schools, for example, have identified eight purposes for the educational technology in their school system: teaching the curriculum, teaching uses of technology, helping students learn, enabling students to work with the complex production models they will find in the workplace, providing a multi-mode approach to learning by accommodating different learning styles, serving as a tool in some performance-based assessments, helping students learning how to solve problems; and enabling a student to become independent from teachers and able to take responsibility for her or his learning.

Hold a Technology Conference

With purposes agreed upon, the committee can begin to decide what specific types of technology it wants to invest in. Several respondents suggested that schools hold computer/educational technology conferences. At these conferences, local technology vendors are invited to display their products and make specific proposals. The conference gives schools a broad feel for many of the different types of technology on the market today and their prices.

STEP 2: Investing in Hardware

"Hardware"--the physical components of a system--is the largest initial investment. A total of $1.4 million is earmarked for hardware in our sample plan (1,400 students x $1,000 per student), and survey respondents suggested using these funds to purchase some combination of the following items:

Classroom Workstations

Most respondents wanted to equip all classrooms with teacher workstations, which typically consist of a computer terminal linked to a large-screen display. They can almost be thought of as "electronic chalk-boards," because teachers can use them in many of the same ways that they use conventional chalk-boards--to provide an outline of the lesson plan for the day, to show examples of work, etc. They can also be linked with CD/ROM players--see "Compact Disk (CD/ROM) Players" section below.

Administrative offices can be equipped with similar workstations, minus the large-screen display. Workstation computers can also allow teachers and administrators to communicate with one another electronically via Local Area Networks (see "Computer File Servers" section below). This gives teachers the opportunity to automate attendance and grading records, communicate quickly with administrative offices, and share curriculum ideas with fellow teachers.

Laptop Computers for Teachers/Administrators

Laptop (or portable) computers are small computers that can fit into a briefcase. Professionals in the private sector have long since discovered the value of these machines, and a true high-performance school should treat its teachers like professionals. Laptop computers allow teachers (and administrators) the flexibility to do their planning, grading, and assessment at home without any loss of productivity.

This flexibility is especially important for teachers, much of whose work is traditionally done after normal work hours and away from the school. Laptop computers will also help teachers with the added responsibilities in curriculum planning and assessment design that come with high-performance schools.

Classroom Workstations for Students

As an important part of meeting students' need to have everyday opportunities for hands-on interaction with computers and other technology, respondents recommend purchasing a number of computer workstations for classrooms. Computers at these workstations are usually desktop units that teachers can set up in the classroom in any number of different configurations, and can link to their workstations to allow them to monitor and assess student progress. These computers also allow students to work on group projects and papers.

Classroom Laserprinters

Laserprinters purchased for each classroom (and for administrative offices) can be linked to both teacher and student workstations. This allows

teachers to print out curriculum materials, homework assignments, notes to parents, and many other items. Students can print out papers and other classroom assignments.

Integrated Learning Systems (ILS) Labs

ILS labs can provide high-quality instruction and a sophisticated individualized capability for virtually all students--low-achieving, average, gifted, English-as-a-second-language, etc. These labs consist of a teacher presentation system linked to computer workstations for 25-30 students each. Computer-assisted courseware combines new techniques for presenting information with extensive use of graphics, color, learning environments, and interactive learning tools.

Teachers can choose to provide whole-class instruction, or run exercises that allow students to receive specialized, individualized attention. Many respondents suggested purchasing at least one (and possibly more) of these systems to augment the teacher and student workstations already in each classroom.

Entire classes are able to sign up for a lab session, allowing every student to have a computer station. Teachers are able to use their lab-presentation system to monitor each student's performance individually and collectively. This way, students get more hands-on experience with computers, and teachers are able to assess students' progress quickly and effectively.

Compact-Disk (CD/ROM) Players

CD/ROM is a technology that is not only affordable but, if used properly, has the potential to revolutionize the way students learn. CD/ROM players should be considered for almost every classroom, as well as for a school's resource center. Classroom workstations linked with these players are transformed into resource centers enabling teachers and students to access video, audio, computerized graphics, text, and animation, and to interact with their computer screens about virtually any subject.

CD disks can store an amazing amount of information--depending on manufacture and type, more than 250,000 typed pages of text, 7,000 photographic quality images, 72 minutes of full-screen animation, and 19 hours of speech. CD/ROM players themselves will play regular CD-audio disks and computer graphics-CD disks, and are full-motion video-ready (which means that information in video form can be seen and manipulated on-screen through the use of the CD/ROM player).

Computer File Servers

Computer file servers are machines that link computers into Local Area Networks (LANs). Within each LAN, separate computer workstations

have a device, such as a token ring or Ethernet board, that connects by wire to the computer server so as to allow persons using different machines to communicate with one another. Teachers can use LANs to share ideas, information, and software. Additionally, linking student stations in a LAN allows students to share hardware and software resources and even to connect with wide area-networks outside of the school environment.

By networking workstations, schools can purchase less-expensive network versions of software that can be stored on a common computer server and accessed by individual student and teacher stations. Also, LANs allow creation of public volumes on computer servers, making it easier for students to store assignments and for teachers to view, correct, and return the assignments. For example, a school could be broken into different LANs by subject area (e.g. history, art, foreign languages, geography, English, mathematics, science, special education, and administrative offices).

Electrical Wiring

As a practical matter, in order for the technology listed above to be used in a school's classrooms, the rooms must be properly wired. Special outlets and extra electrical outlets must be installed for new computer workstations. For security reasons, classrooms and hallways should also be wired with an alarm system to guard against theft.

Technology Resource Center

Many survey respondents suggested that a high-performance school should have a central technology resource center that can be accessed by teachers and students alike. Usually, the center is located in the school's media center (library); provides computers and CD/ROM players, along with supporting software, for students and teachers to use; and allows individuals to sign out a variety of software to use on the center's computers and/or CD/ROM players at their leisure.

In addition to providing information in-house, the center can be linked to a local public-library or university information system by telephone modem. Modems also allow a center to be linked to nationwide computer services and bulletin boards. By introducing this kind of technology, a school can increase dramatically the amount of information available to students and teachers, and can get this information much more quickly.

STEP 3: Investing in Software and Support

"Software" is the term used to describe programs written for and used by a hardware system (usually a computer system). "Support" refers to spending

for maintenance and repair of software and hardware, and the staff costs associated with hiring any additional staff members to deal with technology issues. Decisions about what kinds of software to purchase should be made in conjunction with the decisions about hardware discussed in the previous section. Otherwise, a school may not obtain a good match between its hardware and software (for example, computers with memory or hard-drive limitations may not be able to run a desired software package).

As with hardware, there is a confusing array of educational software currently on the market that is designed to meet the needs of a school or school system. To help sort through the confusion, a school may want to select an educational software vendor that can help decide what kinds of software to purchase with the resources available--in our budget, $280,000 (1,400 students x $200 per student) each year for three years.

It may be helpful to group educational software into four broad categories:

Teachers' Aids. These types of programs are designed to help teachers keep attendance, record grades, design lesson plans, write curricula, and monitor student progress.

Instructional Aids. This software can be integrated into the existing curricula to assist teachers in instructing students. Programs come in many shapes and forms. Examples include programs that drill students in basic skills such as spelling or mathematics, instructional programs that provide students with information about a variety of issues, and programs that develop such higher-order skills as creative thinking and problem-solving.

Multi-Media Software. Examples of this software include CD/ROM and other multi-media programs that blend computer, video, and audio technology into one integrated system. For example, students can watch a scene from Hamlet, learn about the space shuttle, or listen to a section of a Beethoven symphony--all from the same computer terminal. Many educators see this educational software as promising, and prices are rapidly coming down.

Application/Work-Related Software. Examples include word-processing, database, and spreadsheet programs commonly used in real-world workplaces; and technical-applications programs for running computer file servers, telephone modems, etc. Work-related software not only gives students experience with the kinds of programs they will use on the job, but can save enormous amounts of time and effort, such as by enabling students to write and revise papers.

The costs for these software types depend on specific requirements and on vendors used, so it is impossible for us to provide very detailed estimates. However, we break down our software/support budget into three separate areas:

Software for ILS Labs

ILS software, because of its highly interactive and personalized nature, will probably be the most expensive type of software. However, it is also the most comprehensive, since it allows entire classes to work on a wide range of critical skills (e.g. reading skills, mathematics concepts/skills, science, logic, problem solving, language skills, and computer and technology education and literacy). Depending on how many ILS labs the school decides to purchase, a school may want to allocate 25 to 40 percent of its software budget to ILS software.

Software for Classroom and Technology Center

This category includes software from all four types: teachers' aids, instructional aids, application/work-related software, and multi-media software. The cost depends on how a school wants to allocate its resources for the greatest possible impact. To decide this, a school may want to review its purposes for technology; but here are some general guidelines:

Teachers' Organizational Aids. Teachers need to have enough organizational aids (for grading, attendance, assessment, etc.) to allow them to function as true high-performance workers.

Software for Teachers. Teachers must be given enough software to allow them to fully integrate technology into the curriculum.

Media/Technology Resource Center. This center needs a wide range of software available for use by students and teachers.

Software for Students. Students must have access to software (e.g. word-processing, database, and spreadsheet programs) that properly prepare them for work.

Maintenance, Repair, and Replacement of Equipment

A school should allocate five to seven percent of its hardware budget to a special fund that can be used for maintenance, repair, and, most importantly, replacement when the existing hardware and software becomes obsolete (software tends to become outdated at a much faster rate than hardware). While doing this may take away available funds in the short run, in the long run it is necessary to ensure that the technology available to students and teachers is always up-to-date and relevant to what is being used in the world of work.

STEP 4: Investing in Staff Development

Proper integration of technology in the school does not occur in a vacuum. Staff members must be adequately trained to integrate technology into the teaching of school curricula.

While staff development needs vary from school to school, our survey respondents recommended that funds be set aside for an initial technology training program of 10 days for staff (with ongoing training of five days per year) and for hiring at least one full-time computer specialist to provide on-site faculty support and to oversee the ILS lab. (These costs appear in the "software and support" section of our budget.) While these items may seem costly in the short run, in the long run it is more cost-effective to prepare staff members to use technology properly and to realize its fullest potential from the start.

In our survey, we suggested that $300 per student be allocated on an ongoing basis for training and development of staff. This figure is based on the suggestion in Chapter 4 of the SCANS final report, Learning a Living, that a school with 1,400 students could devote $300 per student for staff development activities. If the student/teacher ratio is 25:1, there would be 56 teachers, and each teacher would have $7,500 to use for training.

Not all of this training money would go towards technical training, however. As the report points out, staff members in a high-performance school must also receive training in new ways of thinking and teaching and in taking on new responsibilities. Given this, our sample package assumes that, of the $7,500 per teacher for training, $3,600 should be devoted to technology training and $3,900 to other training activities (the $3,600 for technology training is based on 15 days at $30 per hour).

ASSESSMENT OF THE SCANS COMPETENCIES:
Some Examples

By John Wirt

John Wirt, an independent consultant on skills standards and other job-assessment issues, was formerly Deputy Director of SCANS. Prior to that, he directed the Congressionally-mandated National Assessment of Vocational Education and was a policy analyst for the Rand Corporation.

This paper provides some examples of how the SCANS competencies can be assessed. (See the "Workplace Know-How" chart on p. 6 for a list of the SCANS competencies.) All of the examples have been tested on sample populations. Some also have been evaluated rigorously for validity.

The SCANS competencies present challenging problems for assessment. One potential difficulty is determining the level of students' general competency when their prior knowledge of the specific contexts of assessment exercises may vary significantly. Several of the competencies also involve social skills, and some assessment experts doubt that social skills can be reliably and validly assessed on a large scale. A third potential problem is that the thinking inherent in many of the competencies, such as improving systems and allocating resources, is much more complex and open-ended than generally can be assessed using conventional testing methods.

A variety of innovative assessment techniques undoubtedly will be required to solve these problems. Some of these techniques are illustrated below. In one example, students in an 8th grade mathematics assessment are presented with a realistic problem of planning a restaurant; a response requires integrated performance of a series of tasks over a two-day period, with students working both as individuals and in groups. Another approach is to employ technology, and two of the examples employ videotaped scenarios that create realistic situations and ask for problem solution from the person being assessed.

The examples do not yield general conclusions about the feasibility of assessing the SCANS competencies or about the best approaches to take. All illustrations are from commercial testing companies. None of the illustrations is teacher-made or locally developed.

A considerable amount of experience with teaching the SCANS competencies in education and training programs, coupled with research, will need to occur before methods for assessing the SCANS competencies can be firmly established. The Department of Labor, in cooperation with the Department of Education and the Office of Personnel Management,

has taken a first step toward such an outcome by launching a sizable project to develop techniques for assessing the SCANS competencies in a large-scale survey or on an individual basis. (Project officer is Bill Showler, OSPPD, Rm. N-5637, Employment and Training Administration, 200 Constitution Ave., N.W., Washington, DC 20210, telephone number 202-219-5677.)

The examples that follow were provided generously by staff members at a number of testing organizations. These examples represent neither all of the SCANS competencies nor the full range of assessment approaches. They do, however, range from assessment of job competency generally to assessment of competency in such particular categories as using information (e.g. acquiring and evaluating data, using computers), interpersonal skills, and allocation of resources (time, money, materials, space, and staff).

HAY/McBER

(Job Competency Generally)

Traditional employment interview probes such as "Tell me about your background" or "What are your strengths and weaknesses?" are of limited utility in predicting a person's job competencies--the critical abilities and personal attributes that contribute to successful performance in the workplace. Much greater reliance can be placed upon a Hay/McBer method called the Behavioral Event Interview (BEI), which evaluates what people have actually done in critical workplace situations they have faced.

The BEI format is structured but nondirective. In 90-minute to two-hour interviews, individuals are asked to describe what they did, said, thought, and felt in several critical workplace situations they faced in their own work experience.

These descriptions are then coded by degree of competency reflected in interviewee responses. Such competency categories as customer-service orientation, ability to be a team player, negotiating skills, and capacity for developing better interpersonal relationships--categories which generally correspond to the categories of the SCANS competencies--are measured by comparing interviewee responses with competency definitions derived from more than 250 Hay/McBer job-competency studies spanning thousands of jobs in many types of organizations.

Specific BEI responses exemplify what is considered to be a high degree of workplace competency in particular categories. Consider this response from the customer-service orientation category:

> A client was having some difficulty getting a refund check. She came to me because she said our operations manager was rude to

her. I apologized, helped her get the check, and sent her on her way. It only took a few minutes to straighten out the problem, and she left feeling better than when she came in.

In the category of ability to be a team player:

> I said "O.K., here's a first rough cut of what I think we have to do. What do you think? Does this make sense? Where are the weak points?"

After a BEI has been coded, the interviewee is provided with a profile which shows his or her proficiency levels in each competency category.

The BEI should be administered by someone with a master's level degree in some field of behavioral science. Such people can be readily trained in BEI administration.

For Further Information:
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EDUCATIONAL TESTING SERVICE

(Interpersonal Skills)
Many of us have friends or relatives living in nursing or retirement homes, and we recognize the importance of good care in these institutions. In many cases, their nursing aides must relate daily to residents from a wide variety of cultures and backgrounds, and it is essential that these aides have such interpersonal skills as making residents feel at home, encouraging effective communications, resolving disputes, and ensuring residents' rights.

Procare, a program developed by the Educational Testing Service, assesses these skills as part of the competency exam used to certify nursing aides for continued employment. The program is based upon the use of video technology.

In the program, different nursing/retirement-home situations are projected onto a video screen attached to a hand-held computer. In one situation, for example, a white woman, a Hispanic male, and an African-American male are playing cards. One of the men is smoking a cigarette, which bothers the woman across the table. The other man intervenes on the woman's behalf. The first man, the smoker, ignores the urging of the second man who, in frustration, shoves the first man. The smoker is hard of hearing, and does not understand why he is being attacked.

Portrayal of that situation is followed by portrayal of a nursing aide responding to it in several different ways: (a) separating the residents,

taking the attacker to another area and explaining that the smoker has trouble hearing and that pushing and shoving another resident is wrong, and later speaking to the smoker; (b) telling the smoker to stop smoking and leaving the residents in place to continue their card game; (c) calling the charge nurse to handle the situation; and (d) telling the residents to stop playing cards, disperse, and join other groups.

The exam-taker is then asked to choose one option and to record his or her answer on the hand-held computer. The answer helps reflect the exam-taker's capacity for dealing with similar situations and for displaying sensitivity to racial diversity.

The certification exam has a number of questions based upon such scenarios. If the exam-taker answers a question correctly--in the situation above, (a) is correct--the computer adds to his or her score. If the answer is incorrect, the video screen will display the correct approach and will provide a discussion of what is lacking in some responses to the situation portrayed.

(Using Information -- using computers)
Nancy would like to be a secretary at the local Farm Bureau but wants to work as a temporary secretary first to brush up on her skills, because she knows the Farm Bureau deals with numbers, charts, and general correspondence having to do with farm production and prices. She applies to a temporary-services firm where she hopes to receive additional training and experiences in using new office applications. At the firm, she is given a computer-based performance test to get a complete profile of what computer-application skills she has mastered as well as a diagnosis of what skills she needs to learn.

During the test, Nancy performs work-related exercises designed to evaluate all of the important application functions. If she gets stuck, she can use the "help" function, just like she can in her normal work setting. If Nancy makes a mistake during the test, the computer reacts by giving her a warning and encouraging her to try again. After a second try, the computer informs her that her response is incorrect, and the computer completes the function for her automatically. Using this testing/training technique, Nancy is actually learning new ways to increase her skills each time she is tested. The program, which is called Aequitas, was developed by the Educational Testing Service and KEE Systems to assess and increase skills in word processing, spreadsheet use, typing, data entry, and basic office skills.

At the end of her training, Nancy will receive an Aequitas profile that will demonstrate her proficiency in computer skills. For example, Nancy's profile will include detailed information about which functions she mastered in formating and editing documents, and developing charts and spreadsheet tables, among many other skills. The computer also measures her overall

performance in terms of basic understanding of the functions of the software application, how efficiently she performed them, and how much time she spent on each exercise. To help Nancy learn any functions that were not mastered, the profile also lists the correct sequence of keystrokes and tells her where to look in the application manual to learn more.

When Nancy achieves mastery on the basic level, she may feel that she must do even better to be a good secretary at the Farm Bureau. She can continue practicing and learning at the intermediate level by using this same program of computer-based testing and training until she feels she is ready. Her application to the Farm Bureau will include her Aequitas profile demonstrating her competence in individual computer skills. The profile enhances Nancy's credentials.

For Further Information:
Concerning Procare, contact Gary Echternacht, (609) 951-6154.
Concerning Aequitas, contact Edward Jones, 951-6115. Both at:
Educational Testing Service, Princeton, NJ 08541.

MARYLAND EDUCATION DEPARTMENT

(Allocation of Resources)
The Maryland School Assessment Program for eighth grade math students simulates the real world situation of planning a restaurant. The simulation requires students to use tools (e.g. a calculator) and involves both individual and group activities.

For example, students are asked to imagine themselves as developers proposing a restaurant design to a zoning board. Before assessment, teachers lead the class in discussion of the terms used in the assessment, such as "developer," "market research," "zoning board," and "questionnaire."

In the first assessment activity, the student developers work with a market-research firm to find out what kind of restaurant people want. First they gather in groups to design a questionnaire to accomplish this task. Then, as market researchers, they take the questionnaire and, over a period of one or two days, survey the opinions of 25 people they know.

Next, students display the resulting data in appropriate charts and graphs. This is an individual student task. "Remember," say the directions, "you conducted your own survey. Your data and your displays should not look exactly like anyone else's."

Having decided what kind of restaurant to build, the students now move back to being developers and consider the size and shape of lots available in the community. They use their geometry skills to find the area and to figure out which of three lots will fit their needs (given the results of their

individual surveys). They have to work within realistic restraints: the restaurant must be a rectangular, one-story building of 6,000 square feet; the parking lot must be at least 6,000 square feet, with parking for 30 cars; and there must be some landscaping to make the restaurant attractive.

The students do a scale drawing on graph paper and then a final drawing when they have adjusted their design to the required dimensions. They choose one of the three lots available in their community, and must show (on a scale of 1/2 inch representing 10 feet) where the restaurant and the parking lot are to be built. They calculate the costs of building the restaurant--given specific prices for building, parking lots, equipment, and so on--and are asked to defend their estimates.

In the final assessment activity, each student must write a paragraph to explain the decisions he or she made. This summary accompanies the scale drawing and the other display material presented to the zoning board, and is to be supported by information from the student's tables, charts, and graphs. Students are scored on five competencies: communications, mathematical reasoning, problem solving, making connections (of systems and of resources allocated), and using technology (e.g. the calculators).

Suggested for further reading is Ruth Mitchell's Testing for Learning: New Approaches to Evaluation Can Improve America's Schools (New York: The Free Press, 1991), from which the material here is adapted. This material is presented with permission of the Maryland Education Department and CTB MacMillan-McGraw Hill.

For Further Information:
Contact Robert E. Gabry, Assistant State Superintendent, Maryland School Performance Program, 200 West Baltimore St., Baltimore, MD 21201, (410) 333-2385.

WILSON LEARNING CORPORATION

(Interpersonal Skills)
Wilson Learning Corporation has completed an Electronic Assessment System (EASY™) program called Success Skills 2000™: Benchmarks for High Performance. The program was designed to support the recruitment, selection, and development of people as entry-level professionals in sales, engineering, supervision, and general business jobs. The program assesses candidates in three SCANS-like skill clusters: applied problem-solving, interpersonal effectiveness, and accountability.

The assessment process requires candidates to view a videotape that contains a series of vignettes featuring four different main characters. Each character represents one of the four types of job families targeted by the program. Participants see the characters responding to a wide variety of

situations like those they might experience if they were actually in the job. During the course of the video, the action is interrupted at various points and the participants are asked multiple-choice questions about how they would respond. Candidates' answers are scored by comparing their responses to a model of high performance that is based on a thorough study of the target jobs and validated against job-performance criteria.

Consider the following two examples of vignettes, taken from assessment of (a) the interpersonal-effectiveness cluster for the skill of teamwork and (b) the accountability cluster for the skill of self-management.

In the teamwork vignette, Maria Flores, a recent college graduate in accounting, is shown chatting with co-workers in what appears to be a large accounting firm. She is seated at a conference table for a meeting with co-workers Beth and Joe, and Beth begins the meeting enthusiastically by stating their purpose and checking to be sure that Maria and Joe understand and agree. "Those are the main reasons why both of you were chosen for this committee," says Beth. "I'm really going to rely on you for a lot of help, since I've never run a committee like this before! Where do you think we should start?"

"If you ask me, I think we should work on our own for a while to see what kinds of ideas we come up with independently," responds Joe. This suggestion brings a look of frustration from Beth.

"Well, Joe, I can see your point of view," replies Beth, her voice betraying a hint of the frustration evident on her face. "But we have assembled this committee so that we can share ideas." Beth draws out the word "share" as if to emphasize her desire to work together rather than independently. "Maria, what do you think we should do?"

The video action freezes and the participant is asked, "If you were Maria, what would you do next?" Four options are presented that represent more or less effective strategies for resolving the impasse. The options include: (a) tell the group members that the group should rely on educational experts for advice; (b) suggest that the group members work individually at first to gather the needed information; (c) suggest that the group meet weekly to exchange information; and (d) suggest that the group work together initially to brainstorm ideas about how to proceed.

In this vignette, the main character is in a team/committee setting. The team members have different opinions on the best approach to use. The implied objective of the assignment is to use a team approach involving group cooperation. Even though one team member expressed a preference to work alone, the correct answer, (d), best meets that objective. The answer reflects a compromise between the two committee members.

In the self-management vignette, the scene begins with Ken Leah, a young energetic sales representative for an office-products company, entering the waiting area of what looks to be a corporate office. Ken finds a seat in the waiting area and begins thinking about the sales presentation he will deliver to Bob in a few minutes. "I'm really ready for this," he says to himself confidently. "It's timed perfectly for 30 minutes. I can close on the two products we've already talked about, plus introduce three new ones." Ken radiates enthusiasm as he continues rehearsing his big presentation. Judy's voice breaks Ken's concentration: "Bob will see you now."

Bob appears from around a corner and welcomes Ken. Clearly, Bob and Ken have met before and get along comfortably as they exchange greetings. "I know we set aside a half-hour for our meeting," says Bob somewhat apologetically, "but my boss just called and asked me to come to his office in 15 minutes. So, we need to cut this meeting short. I'm very sorry." Ken nods and enthusiasm drains from his expression.

At this point, the video vignette stops and the participant is asked, "If you were Ken, what would you do next?". Participants are asked to select one of four possible actions that reflect different ways of adapting to new circumstances: (a) tell Bob that you understand, and suggest to him that the meeting be rescheduled as soon as possible; (b) tell Bob that you understand, and review only the most important points of your presentation; (c) tell Bob that you understand, and proceed with your planned agenda until you have to schedule another meeting to complete it; (d) tell Bob you understand, and leave him literature about the products.

In this vignette, the main character has planned for a 30-minute presentation only to find out that the available time is just 15 minutes. The correct answer, (b), provides the opportunity to close the sale of the two products and accomplish the first objective. While the new-product introductions are important, a second meeting could be scheduled at a later date to present the new products.

Interpersonal Skills--serving customers)

Often employment interviews are not objectively linked to the necessary skills and competencies for successful job performance. Structuring the interview process and clearly linking questions to job competencies increases the validity and utility of traditional unstructured interviews.

Wilson Learning has developed a competency-based, structured-interview product known as Performance Based Interviewing Plus™ (PBI), which contains questions that ask the interviewee to describe past work experiences. To make the structured interviews easy to conduct and evaluate, they include targeted questions and evaluation criteria for scoring.

Questions and evaluation criteria are developed from a thorough job analysis which includes input from incumbents, supervisors, managers, and

subject-matter experts. During the job analysis, behavioral samples are gathered and written as behaviorally-anchored scales of job performance, and these rating scales are then used as objective criteria for evaluation.

For example, included in the interpersonal skills competency for the job of customer-service representative is developing positive customer relations. This task is defined as effectively greeting customers, establishing rapport, and maintaining trust, both in person and on the telephone, by determining customers' desired styles of interaction and responding accordingly.

The lead question in interviewing a worker in this job might well be "Please describe a situation where you worked with someone who was very different from you." The answer would then be developed by asking several targeted questions, such as "In what ways did you and that person differ?"; "What actions, if any, did you take to establish rapport?"; and "Were you successful at establishing rapport? Why or why not?".

Scoring of the answers to these questions is guided by using performance standards as the evaluation criteria. These standards are a valuable and constructive part of the process. Did the interviewee, for example:

- Establish and maintain excellent rapport with customers by making eye contact, smiling, using their names?
- Put customers at ease by displaying a relaxed manner during conversations?
- Adapt her or his interaction style to customers' interaction styles?
- Greet customers or others politely, enthusiastically, and according to company policy?
- Courteously and competently assist customers?
- Help customers as quickly as possible, or explain any delays in advance?
- Use humor appropriately, respecting customers' concerns?
- Empathize with customers' problems and concerns, and allow them to vent their frustrations?

PBI is designed to be used by line managers, supervisors, and recruiters who are trained and certified. To increase the accuracy and reliability of the process, two people independently interview and evaluate each candidate, and the competency profile is scored using the pooled judgements of the two interviewers. Other competencies and foundation skills that can be assessed by the PBI process include teamwork skills, communicating, negotiating skills, listening, and thinking creatively.

For Further Information

Contact Joseph T. Sefcik, Director, Channels Marketing, Wilson Learning Corporation, 2180 W. Hwy. 434, Sanlando Center #4100, Longwood, FL 32779, 1-800-833-EASY.

(Using Information -- acquiring and evaluating data)

Work Keys is a new system ACT is developing to teach and assess workplace skills. Most work settings require employees to make decisions based on multiple pieces of information considered simultaneously. Work Keys communications assessments (reading, locating information, writing, listening, and speaking) include questions requiring examinees to evaluate data in the context of a specific decision to be made. For example:

> DRG Industries, Inc. uses two overnight services, Quick Delivery Services and Overnight Mail Services. Quick Delivery Services makes deliveries Monday through Friday. It has a weight limit for packages, and guarantees an item will be delivered before 10:30 a.m. However, it will not make deliveries on weekends or holidays. This is a new company, and only delivers to major cities. If you decide to use it, you bring your package to the mail services department by 2:30 p.m. on the day it should be sent.
>
> If you decide to use Overnight Mail Services, you can bring your package to mail services as late as 5 p.m. The company can deliver packages weighing up to 50 pounds. It serves large cities and most towns, but you must have a street address. Packages are delivered between 10:30 a.m. and 1 p.m. The company will not deliver on weekends or holidays.
>
> On Wednesday you are given a large box that must be delivered overnight to Chicago. In choosing which mail service to use, what would be the deciding factor?: (a) destination of the package, (b) day of the week it is sent, (c) cost of using the mailing department, (d) weight of the package, or (e) contents of the package.

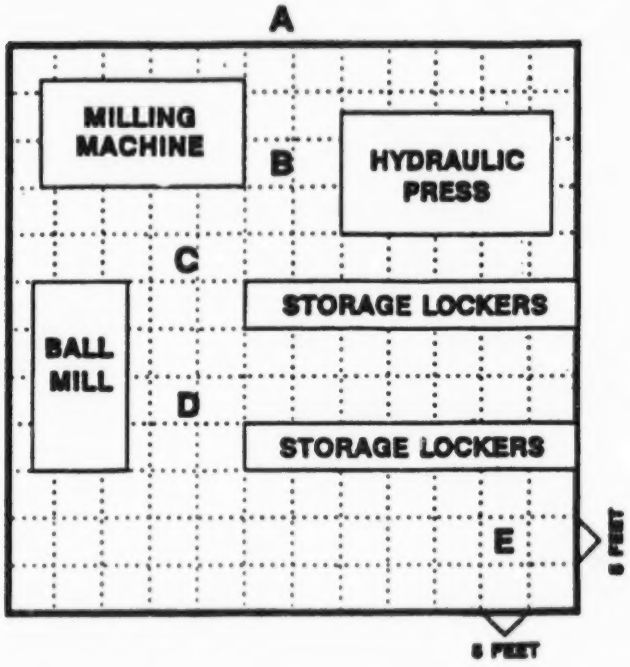
The correct answer is (d), weight of the package. Since the package is to go overnight and was given to the worker on Wednesday, the day of the week it is sent is not the deciding factor. Since the package is going to a major city, Chicago, destination is not the deciding factor either. The companies have comparable costs and similar limitations on package content, eliminating cost and content as deciding factors. Since Overnight Mail Services will not accept a package that weighs more than 50 pounds, weight is the deciding factor.

(Allocation of Resources -- materials and facilities)

Most workplace settings require employees to solve problems on the job. The Work Keys problem-solving assessments (applied mathematics, applied technology, and learning skills) include questions requiring examinees to solve various problems relating to allocation of resources. For example:

You have ordered a new milling machine from a manufacturer. You want to install it at Point E in the room shown below. The dimensions of the shipping crate are 275 cm x 365 cm x 300 cm high. The machine cannot be turned on its side. To avoid damage, you want to move it as far as you can in its crate. Between which of the points labelled below, if any, will you have to uncrate the machine so it can be moved to Point E?

Note: 1 foot = 12 inches
1 yard = 3 feet
1 mile = 5,280 feet
1 inch = 2.54 centimeters (cm)
1 meter = 100 cm
1 kilometer = 1,000 meters



The optional answers are: (a) A and B, (b) B and C, (c) C and D, (d) D and E, and (e) the milling machine can be moved to Point E without being uncrated.

The correct answer is B. The dimensions of the crate are 9 feet 0.24 inches by 11 feet 11.76 inches. The crate can be moved in through the doorway (from Point A to Point B); however, it cannot be turned to negotiate the corner between Points B and C.

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(Interpersonal Skills -- negotiating)
Most workplace settings require employees to cooperate with and support one another in order to accomplish work tasks. The Work Keys personal skills assessments (teamwork and motivation) include questions that require examinees to identify appropriate actions to take in order to both support other team members and get the work done. Consider the scenario for assessing teamwork (a scripted version of what Work Keys presents on videotape):

> **Narrator**: Pat and Chris are part of a team responsible for packing boxes for distribution.
>
> **Pat** [waving a paper at Chris and looking happy and excited]: Did you see this notice saying the new advertising project will mean about 30 hours of extra work during the next two weeks? I've already talked to the other team members, and we're all thinking that this could be really good for the company.
>
> **Chris** [glumly]: Yeah. I saw the notice. [Frowning] And I'm not wild about the extra hours, either. [Brightening a bit] I wouldn't mind having the extra money, though.
>
> **Pat** [still excited, trying to persuade Chris]: I think it's really great that our team has been asked to do the work. Management must have a lot of confidence in us!
>
> **Chris** [cynically]: Right. They think we're wonderful.
>
> QUESTION: In order to persuade Chris to support working the overtime management has requested, Pat should emphasize: (a) the benefit the new advertising project will have for the company, (b) the fact that the other team members support the project, (c) the extra money the overtime will bring, or (d) the confidence management is showing in their team.

Chris has shown little interest in the benefits the new project will bring to the company or the fact that other team members are supportive of the project. He has already responded negatively to Pat's mention of management's confidence in them. However, he has indicated an interest in the extra money, so that is the best factor to emphasize in trying to persuade him to support working the overtime.

For Further Information
Contact American College Testing, 2201 North Dodge St., P.O. Box 168, Iowa City, IA 52243, (319) 337-1710.

The examples above illustrate methods of assessment for a variety of SCANS competencies. Two of the examples are for the SCANS competencies of using information and two for allocating resources. Five of the examples are for the interpersonal skills competency--one for negotiating, one for teamwork, one for managing diversity, and two for customer service. Most of these assessments of interpersonal skills competency have been shown to meet accepted criteria of validity.

All of the assessments involve simulating or describing realistic situations/problems that elicit responses/solutions from test-takers. A total of five basic methods are included: structured interviewing, computerized testing, videotaped scenarios, performance assessment, and what can be called extended word problems. In two of the examples (Behavior Event Interviewing and Performance Based Interviewing™), respondents create the situations themselves by recalling episodes from their own work experience. In four other cases, situations are presented using a video-screen or videotape in some manner.

All but four of the examples provide the respondent with multiple-choice options that have a preferred answer, but not necessarily one right answer. Two of these exceptions are the interviewing methodologies; the other two are the only full-fledged performance assessments in the group--the Maryland State Assessment Program and the ETS computer-skills exam.

Methods of performance assessment involving the complex performance of authentic tasks are just beginning to be developed, although for years industrial psychologists have assessed managers by evaluating how they deal with an in-box and its contents, and work-sample testing also has a long history--although the tasks involved can be fairly discrete. Two groups are developing performance assessments for SCANS or SCANS-like competencies: the Work Readiness Group of the New Standards Project at the University of Pittsburgh (**CONTACT:** Davis Jenkins, New Standards Project, Learning Research and Development Center, University of Pittsburgh, 3939 O'Hara St., Rm. 408, Pittsburgh, PA 15260, 412-624-7485) and the State Assessments Program of the Council of Chief State School Officers (**CONTACT:** Stan Rabinowitz, Far West Laboratory, 730 Harrison St., San Francisco, CA 94107-1242, (415) 241-2771; or Ed Roeber, Director, State Assessment Program, Council of Chief State School Officers, 1 Massachusetts Ave., N.W., Washington, DC 20001, (202) 336-7045).

The effort to develop competency-assessment methods that are practical and meet established criteria of reliability, fairness, and validity present a real challenge, but one that is essential for the future success of SCANS principles. Educators are beginning to find that well-developed performance-assessment is just as valuable for teaching and learning as for measuring student progress. A good performance assessment challenges students to think and provides them with manifold opportunities to learn from their own efforts to solve problems.

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